

Brazilian Gross Fixed Capital Formation from 2000 to 2009: a Multisectoral Analysis

Fabio Freitas, David Kupfer, Esther Dweck
and Thiago Miguez
(IE-UFRJ)

2012 WORLD KLEMS CONFERENCE
Cambridge, Aug 9, 2012

Content

- Motivation
- Database: sources and compilation methodology
- A multisectoral analysis of the GFCF in the Brazilian economy from 2000-2009: some results

Motivation

- The Brazilian economy has experienced an increase in its GDP trend growth rate in the 2000's in comparison with the 1990's (notably from 2004 onwards)
- Both GFCF growth rates and the investment ratio also have increased
- Those facts have led to a discussion of the relation between output growth and investment dynamics that is connected with two main topics:
 - The sustainability of the higher GDP growth rates;
 - The structural change direction, in particular the debate on the existence of a deindustrialization process
- The paper aims to contribute to this discussion by presenting a multisectoral account of the evolution of aggregate investment in the period from 2000 to 2009, based on the annual capital flow matrices compiled for the LA-KLEMS project

Database: sources and compilation methodology

- Context:
 - PIB Project (Investment Perspectives in Brazil) in 2009 and the compilation of the first detailed capital flow matrix (CFM) for the year of 2005;
 - LA-KLEMS Project (2010-2012) and the compilation of the annual CFMs for the period 2000-2009;

Database: sources and compilation methodology

- PIB Project (Investment Perspectives in Brazil) and the 2005 Brazilian capital flow matrix
 - Research partnership between GIC/IE/UFRJ – CONAC/IBGE – BNDES
 - Task 1: mapping and evaluation of the available databases on GFCF for the Brazilian economy at the sectoral level
 - Task 2: the development of a compilation methodology compatible with the available databases
 - Task 3: implementation and improvements of the compilation methodology

Database: sources and compilation methodology

- The 2005 capital flow matrix (CFM) compilation methodology in a nutshell
 - The methodology involved the compilation of 3 matrices in the following sequence: the CFM of imported products; the CFM of total supply; and the CFM of domestic products

$$CFM_{TS} = CFM_{IP} + CFM_{DP}$$

Database: sources and compilation methodology

- The compilation of the CFM of imported products
 - Sources
 - a) information on the values of imported (8 digit NCM)products classified by the type of use (gross fixed capital formation, consumption etc.)
 - b) information on the values of imported (8 digit NCM)products classified by an enterprise of destination (identified by the respective CNPJ)
 - c) The vector of imported fixed capital assets from the Brazilian input-output tables (110 products and 19 fixed capital assets)

Database: sources and compilation methodology

- The compilation of the CFM of total supply products
 - Sources
 - a) information on the demand for fixed capital assets (at the work level of IBGE, with 293 products of which 55 enters the gross fixed capital formation) by institutional sectors
 - b) information on the demand for construction and transport equipment products by industry sectors coming from the Federal Revenue of Brazil
 - c) information on the shares of output value, value added and employment of the industry sectors on the institutional sectors
 - d) 3 digit level information on gross fixed capital formation and output values coming from the IBGE's annual surveys on industry, services, construction and commerce

Database: sources and compilation methodology

- The compilation of the CFM of total supply products
 - Sources
 - e) 8 digit level information on output values coming from the industrial annual product survey
 - f) Output share of CNAE (National Industry Sector Classification) local units on CNAE enterprises
 - g) 5 digit level information on demand for fixed capital assets by industry sectors (CNAE) based on data from the BNDES's credit line for the acquisition of equipment and machinery (FINAME)
 - h) Vector of total supply of GFCF at basic prices from the 2005 Brazilian Input-Output tables

Database: sources and compilation methodology

- The compilation of the CFM of domestic products
 - Compiled as the difference between the CFM of total supply and the CFM of imported products
 - Estimation controlled by the vector of GFCF of domestically produced fixed capital assets coming from the 2005 Brazilian Input-Output tables

Database: sources and compilation methodology

- LA-KLEMS Project and the compilation of the annual CFMs for the period 2000-2009
 - Continued Research partnership between GIC/IE/UFRJ – CONAC/IBGE – BNDES with the addition of the support of LA-KLEMS team
 - Compilation methodology adapted in order to deal with lack of some important databases that existed for 2005

Database: sources and compilation methodology

- The annual capital flow matrices (CFM) compilation methodology
 - The methodology involved the compilation of 3 matrices in the same sequence: the CFM of imported products; the CFM of total supply; and the CFM of domestic products
 - Additionally, the 2005 CFM was used as a “Benchmark” from which we utilized some data structures

Database: sources and compilation methodology

- The compilation of the CFM of imported products
 - Sources
 - a) information on the values of imported (8 digit NCM) products classified by the type of use (gross fixed capital formation, consumption etc.)
 - b) information on the values of imported (8 digit NCM) products classified by an enterprise of destination (identified by the respective CNPJ) (Not Available)
 - c) The vector of imported fixed capital assets from the Brazilian input-output tables (Not Available)

Database: sources and compilation methodology

- The compilation of the CFM of total supply products
 - Databases
 - a) information on the demand for fixed capital assets (at the work level of IBGE, with 293 products of which 55 enters the gross fixed capital formation) by institutional sectors (Available only from 2006 to 2009)
 - b) information on the demand for construction and transport equipment products by industry sectors coming from the Federal Revenue of Brazil (Not Available)
 - c) information on the shares of output value, value added and employment of the industry sectors on the institutional sectors
 - d) 3 digit level information on GFCF and output values coming from the IBGE's annual surveys on industry, services, construction and commerce

Database: sources and compilation methodology

- The compilation of the CFM of total supply products
 - Sources
 - e) 8 digit level information on output values coming from the industrial annual product survey
 - f) Output share of local units (CNAE – National Industry Sector Classification) on enterprises (CNAE – National Industry Sector Classification)
 - g) 5 digit level information on demand for fixed capital assets by industry sectors (CNAE) coming from the BNDES's credit line for the acquisition of equipment and machinery (FINAME)
 - h) Vector of gross fixed capital formation at basic prices from the 2005 Brazilian Input-Output tables (Not Available)

Database: sources and compilation methodology

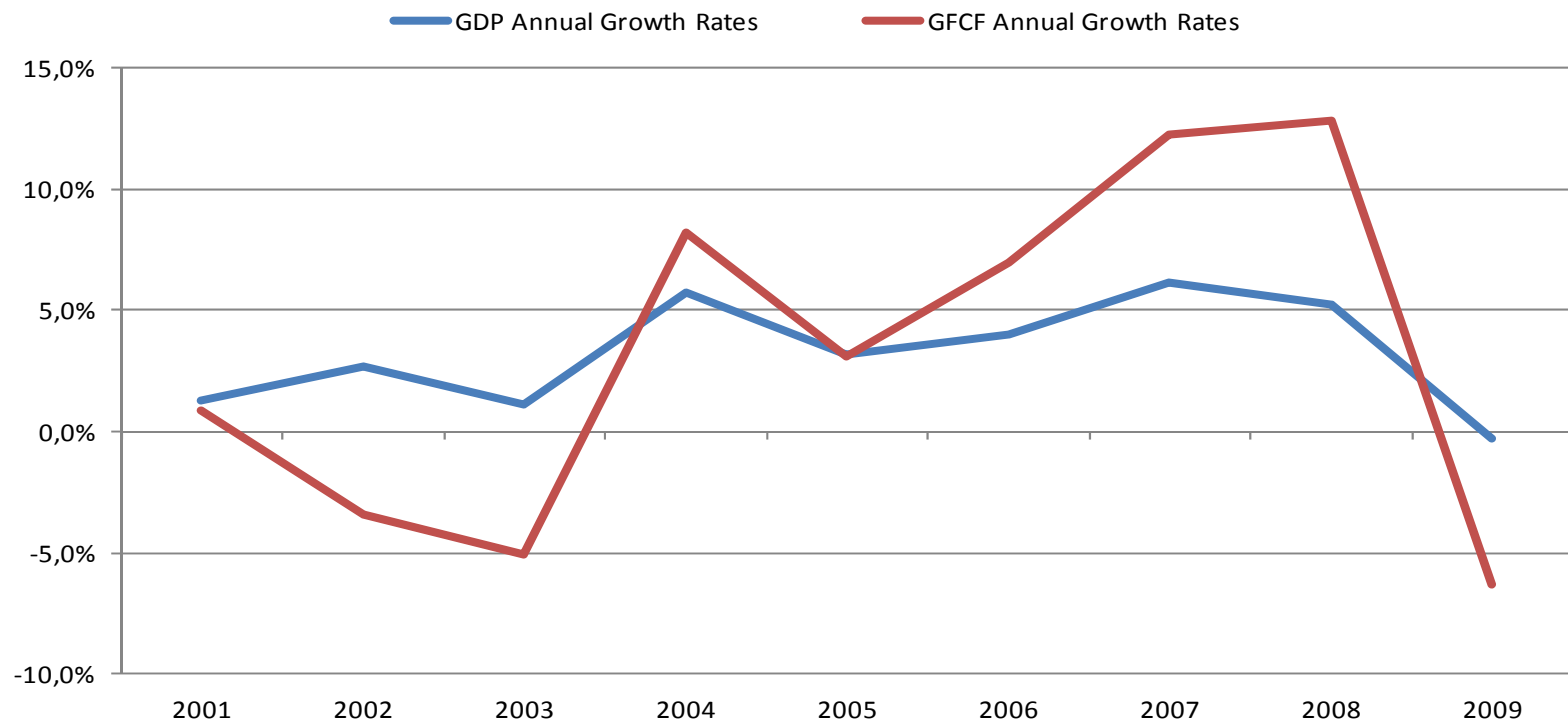
- The compilation of the CFM of domestic products
 - Compiled as the difference between the CFM of total supply and the CFM of imported products **without** the restriction imposed by the vector of gross fixed capital formation of domestically produced fixed capital assets coming from Input-Output tables.

Database: sources and compilation methodology

- Current value CFMs were deflated by SNA GFCF annual deflators from the use tables to produce 2000 constant prices CFMs
- Current value sectoral output were deflated by SNA output annual deflators from the supply tables to produce a 2000 constant prices output series

Brazilian GFCF 2000-2009: Some Results

GFCF Annual Growth Rates



Source: BR-KLEMS

Brazilian GFCF 2000-2009: Some Results

Average Annual GFCF Growth Rates

Sectors	2000-2004	2004-2008	2000-2008	2000-2009
AGRICULTURE, HUNTING, FORESTRY AND FISHING	9,0%	13,2%	11,1%	4,2%
MINING AND QUARRYING	13,7%	16,1%	14,9%	8,3%
TOTAL MANUFACTURING	-2,4%	16,4%	6,6%	1,2%
ELECTRICITY, GAS AND WATER SUPPLY	-5,0%	8,5%	1,5%	-1,1%
CONSTRUCTION	-2,1%	35,1%	15,0%	6,5%
WHOLESALE AND RETAIL TRADE	-6,2%	14,6%	3,7%	0,0%
TRANSPORT, STORAGE AND POST	1,9%	20,1%	10,6%	6,6%
INFORMATION AND COMMUNICATION SERVICES	-6,3%	3,4%	-1,6%	-4,2%
REAL ESTATE, RENTING AND BUSINESS ACTIVITIES	-1,6%	18,7%	8,0%	2,2%
HOTELS AND RESTAURANTS	-9,3%	16,5%	2,8%	0,8%
PRIVATE EDUCATION	-7,6%	-10,0%	-8,8%	-12,2%
PRIVATE HEALTH	-3,7%	19,0%	7,1%	2,7%
FINANCIAL INTERMEDIATION	-3,5%	14,9%	5,3%	0,2%
PUBLIC ADMIN, DEFENCE, EDUCATION AND HEALTH ; COMPULSORY SOCIAL SECUR	0,7%	18,1%	9,1%	6,8%
HOUSEHOLDS	1,1%	5,8%	3,4%	2,5%
NPISH	-6,2%	17,6%	5,0%	2,6%
TOTAL	-0,3%	13,9%	6,6%	2,9%

Source: BR-KLEMS

Brazilian GFCF 2000-2009: Some Results

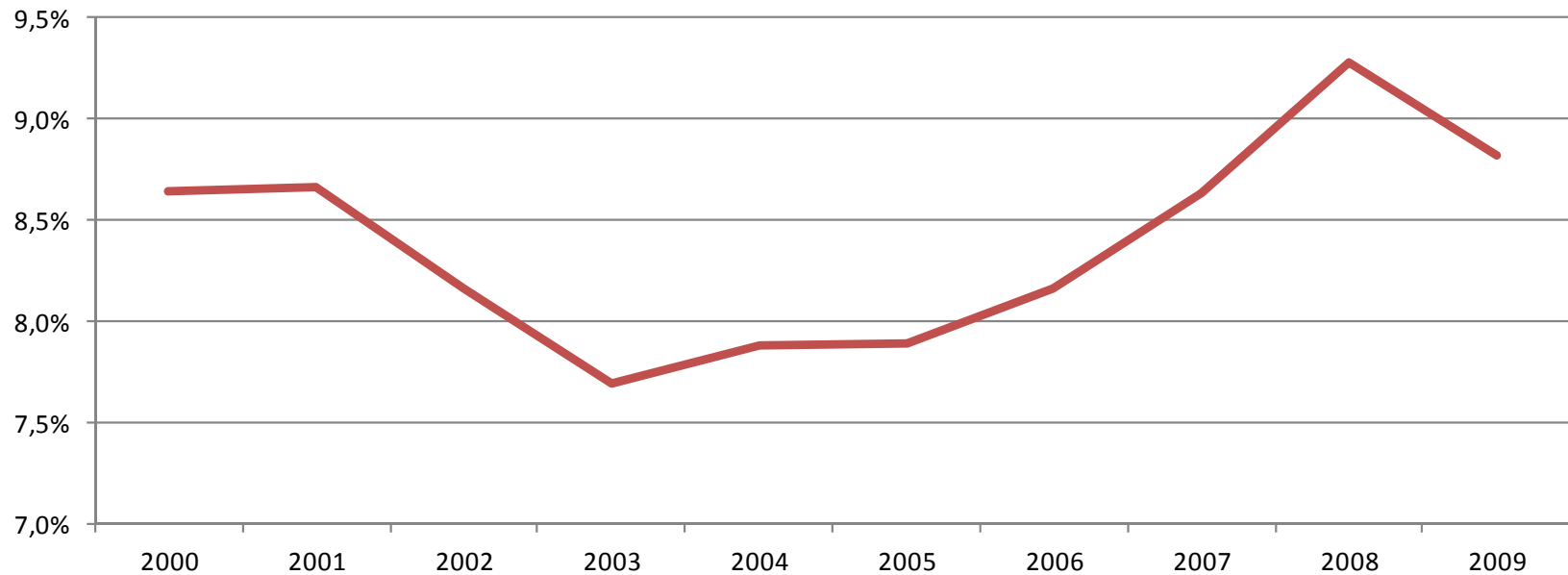
Sectoral Contributions for Average Annual GFCF Growth Rates

Sectors	2000-2004	2004-2008	2000-2008	2000-2009
AGRICULTURE, HUNTING, FORESTRY AND FISHING	0,6%	1,0%	0,7%	0,2%
MINING AND QUARRYING	0,2%	0,4%	0,3%	0,2%
TOTAL MANUFACTURING	-0,5%	3,5%	1,5%	0,2%
ELECTRICITY, GAS AND WATER SUPPLY	-0,1%	0,2%	0,0%	0,0%
CONSTRUCTION	-0,1%	1,4%	0,6%	0,2%
WHOLESALE AND RETAIL TRADE	-0,3%	0,6%	0,2%	0,0%
TRANSPORT, STORAGE AND POST	0,1%	1,4%	0,7%	0,4%
INFORMATION AND COMMUNICATION SERVICES	-0,2%	0,1%	0,0%	-0,1%
REAL ESTATE, RENTING AND BUSINESS ACTIVITIES	-0,1%	0,6%	0,3%	0,1%
HOTELS AND RESTAURANTS	-0,1%	0,2%	0,0%	0,0%
PRIVATE EDUCATION	0,0%	0,0%	0,0%	0,0%
PRIVATE HEALTH	-0,1%	0,3%	0,1%	0,0%
FINANCIAL INTERMEDIATION	0,0%	0,1%	0,0%	0,0%
PUBLIC ADMIN, DEFENCE, EDUCATION AND HEALTH ; COMPULSORY SOCIAL SECUR	0,1%	2,3%	1,2%	0,9%
HOUSEHOLDS	0,3%	1,6%	0,9%	0,7%
NPISH	-0,1%	0,2%	0,1%	0,0%
TOTAL	-0,3%	13,9%	6,6%	2,9%

Source: BR-KLEMS

Brazilian GFCF 2000-2009: Some Results

Brazilian Investment Ratio*

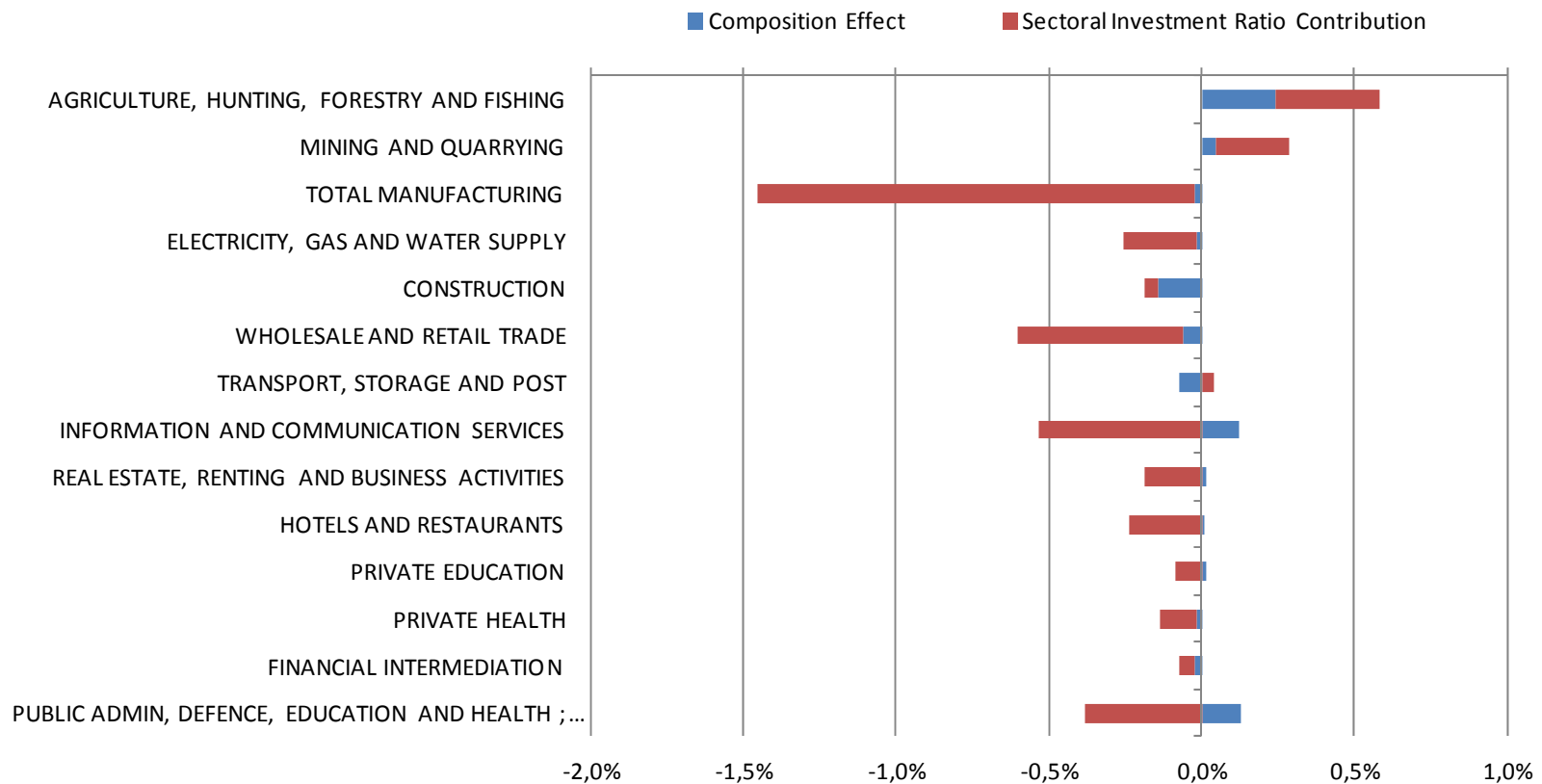


Source: BR-KLEMS

* Households and NPISH Investment excluded

Brazilian GFCF 2000-2009: Some Results

GFCF Growth Decomposition Analysis (2000-2004)

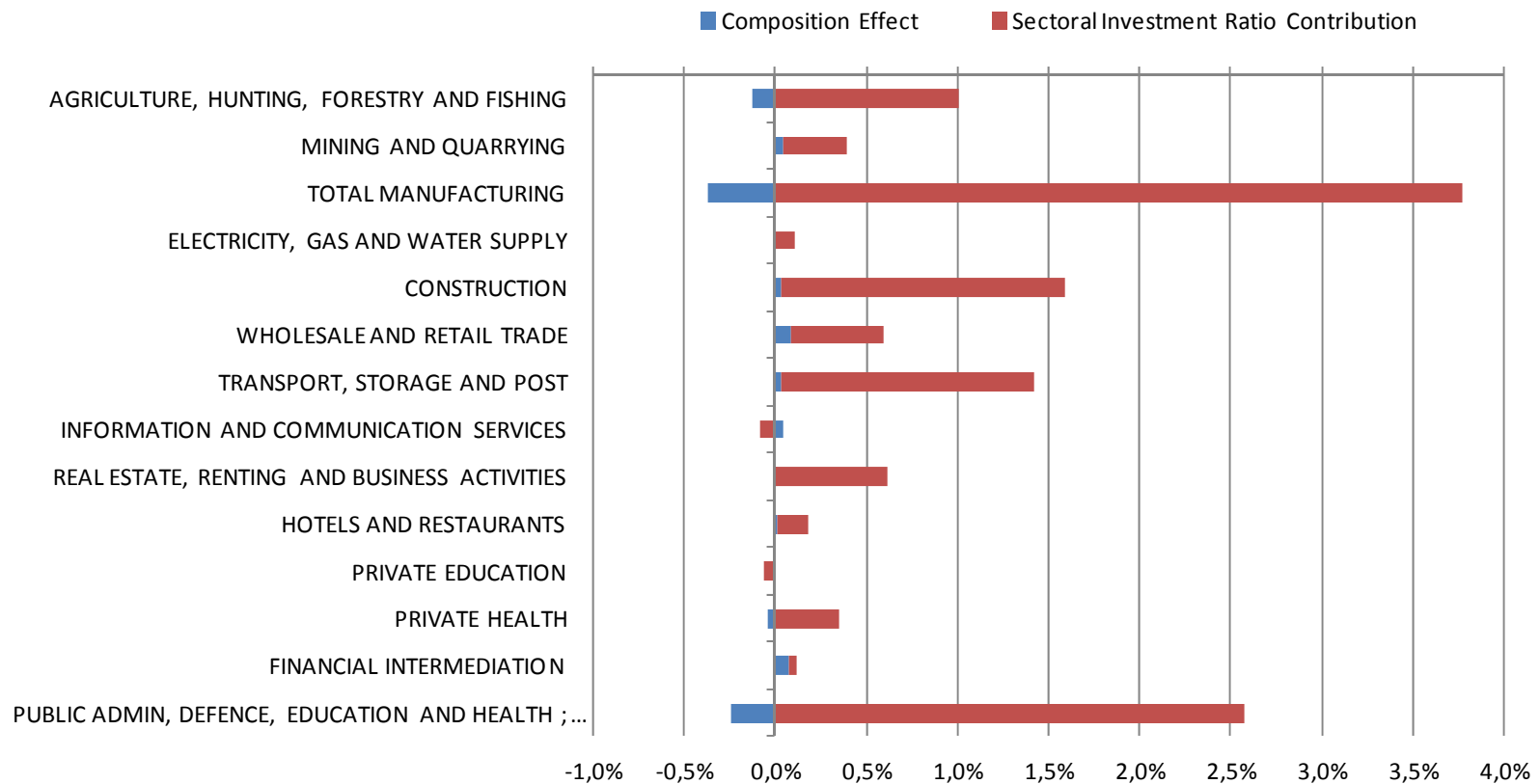


Source: BR-KLEMS

* Households and NPISH Investment excluded

Brazilian GFCF 2000-2009: Some Results

GFCF Growth Decomposition Analysis (2004-2008)

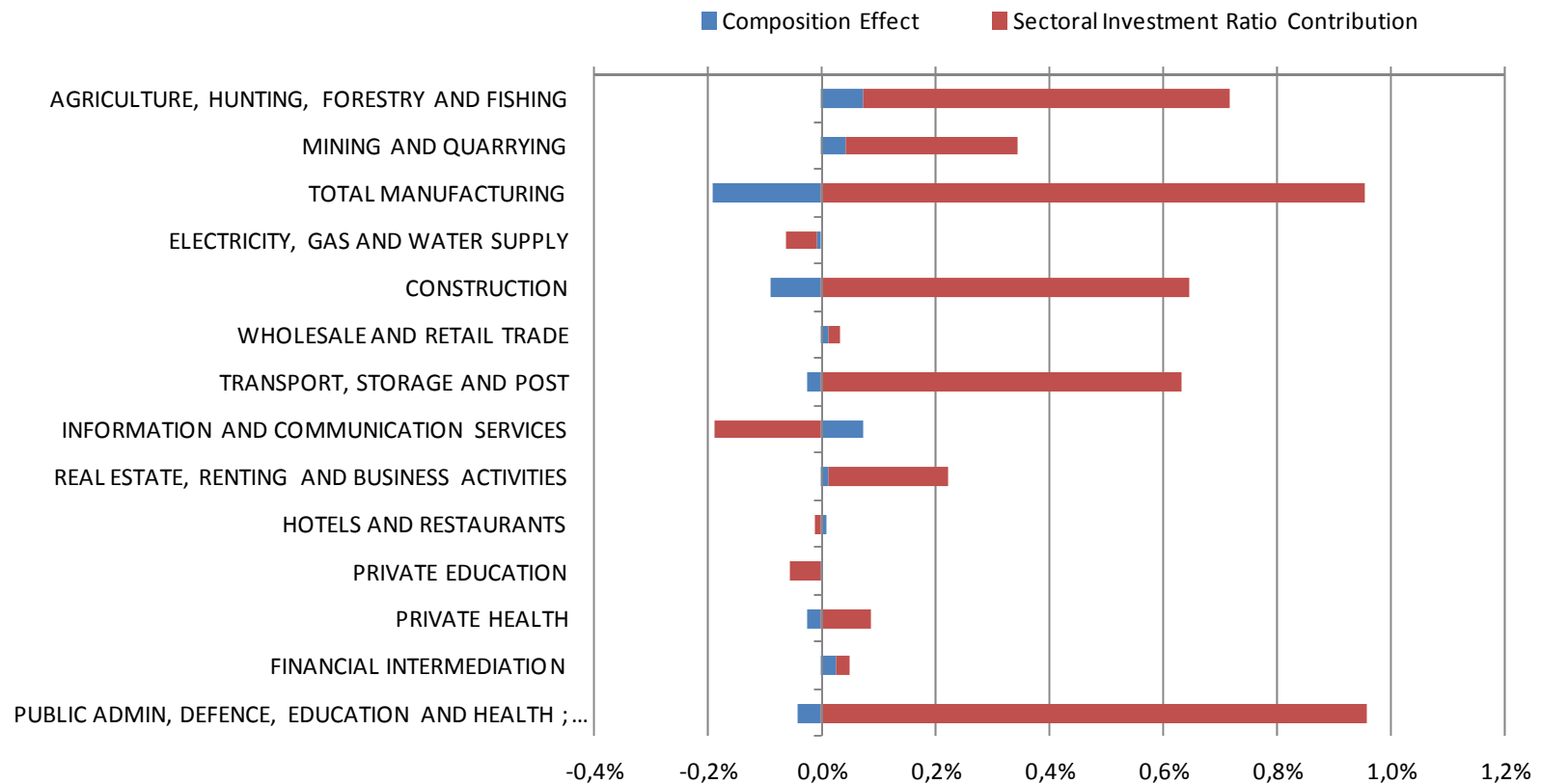


Source: BR-KLEMS

* Households and NPISH Investment excluded

Brazilian GFCF 2000-2009: Some Results

GFCF Growth Decomposition Analysis (2000-2008)

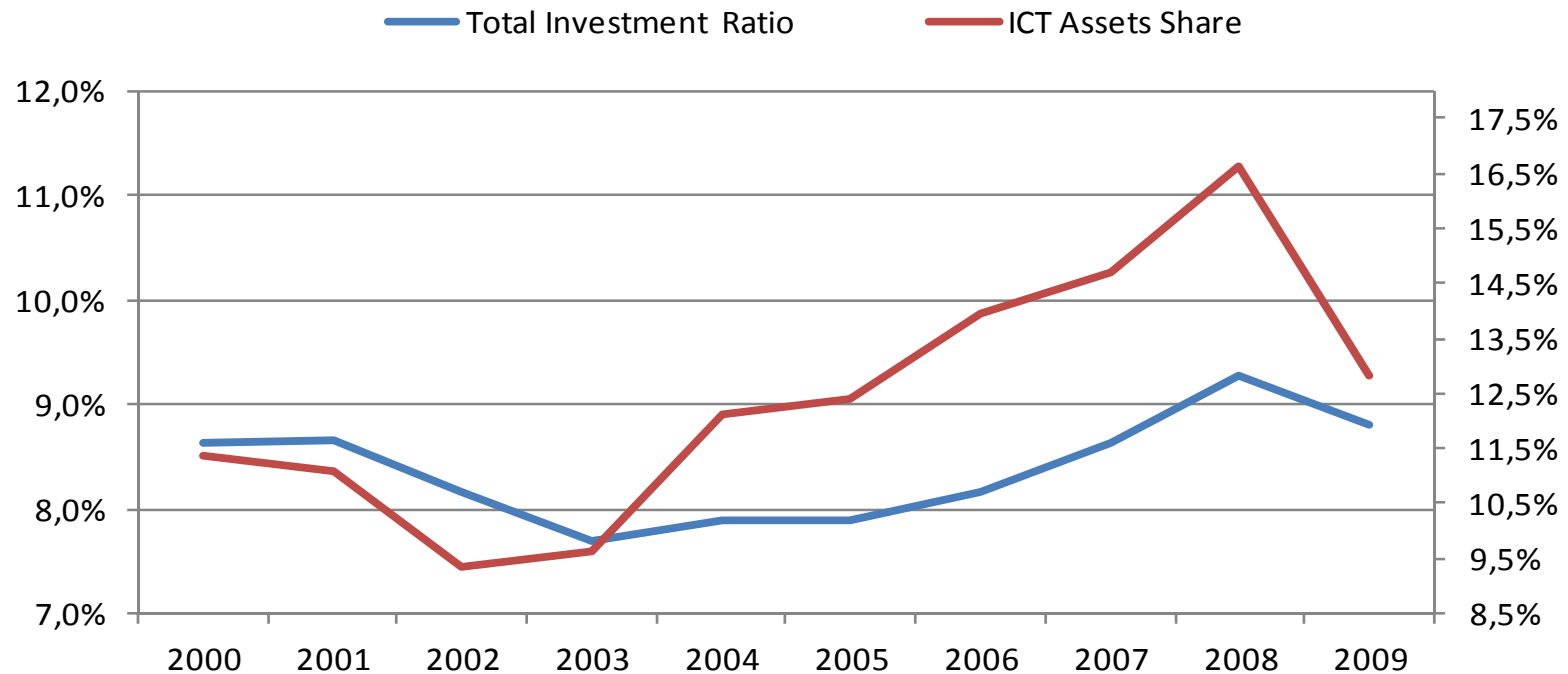


Source: BR-KLEMS

* Households and NPISH Investment excluded

Brazilian GFCF 2000-2009: Some Results

ICT Assets Share in Investment Ratio*

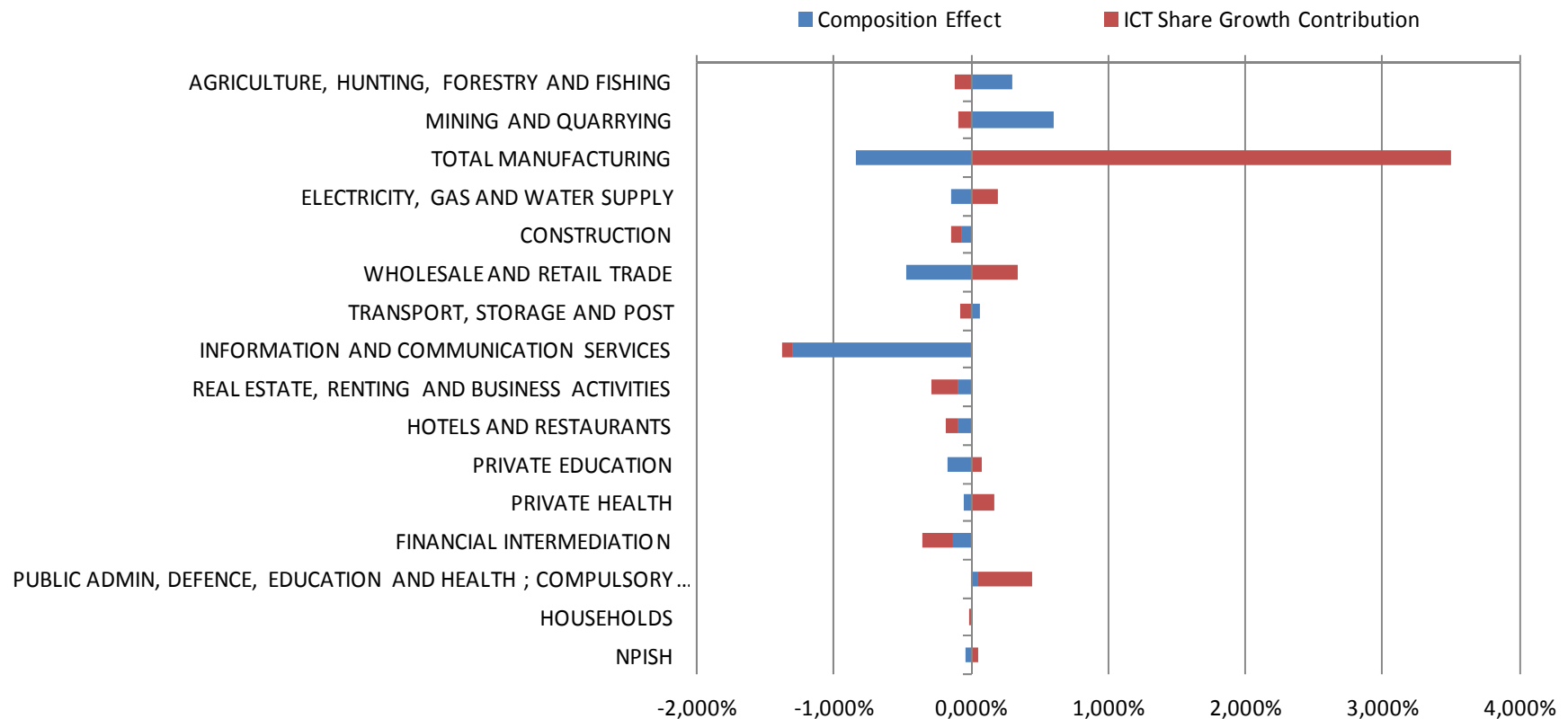


Source: BR-KLEMS

* Households and NPISH Investment excluded

Brazilian GFCF 2000-2009: Some Results

ICT Assets Growth Decomposition Analysis (2000-2004)

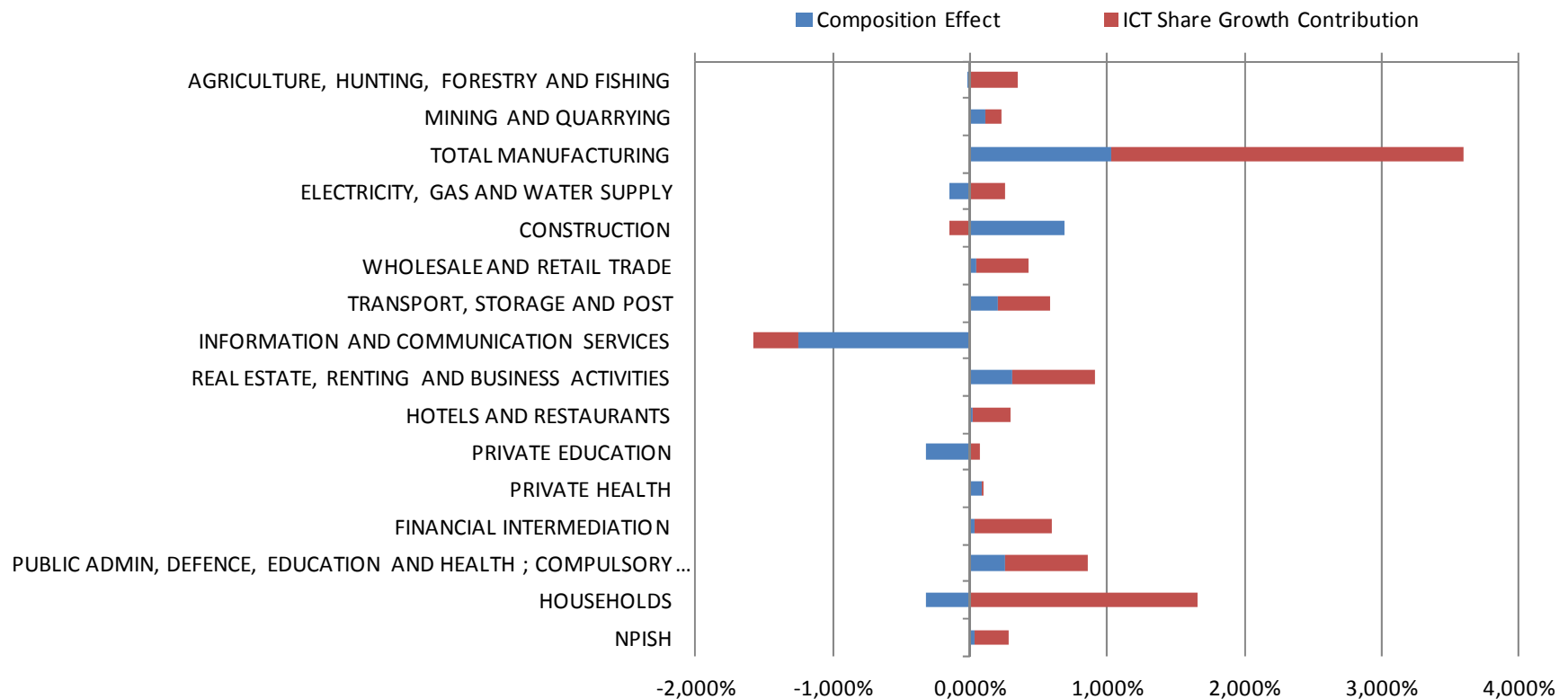


Source: BR-KLEMS

* Households and NPISH Investment excluded

Brazilian GFCF 2000-2009: Some Results

ICT Assets Growth Decomposition Analysis (2004-2008)

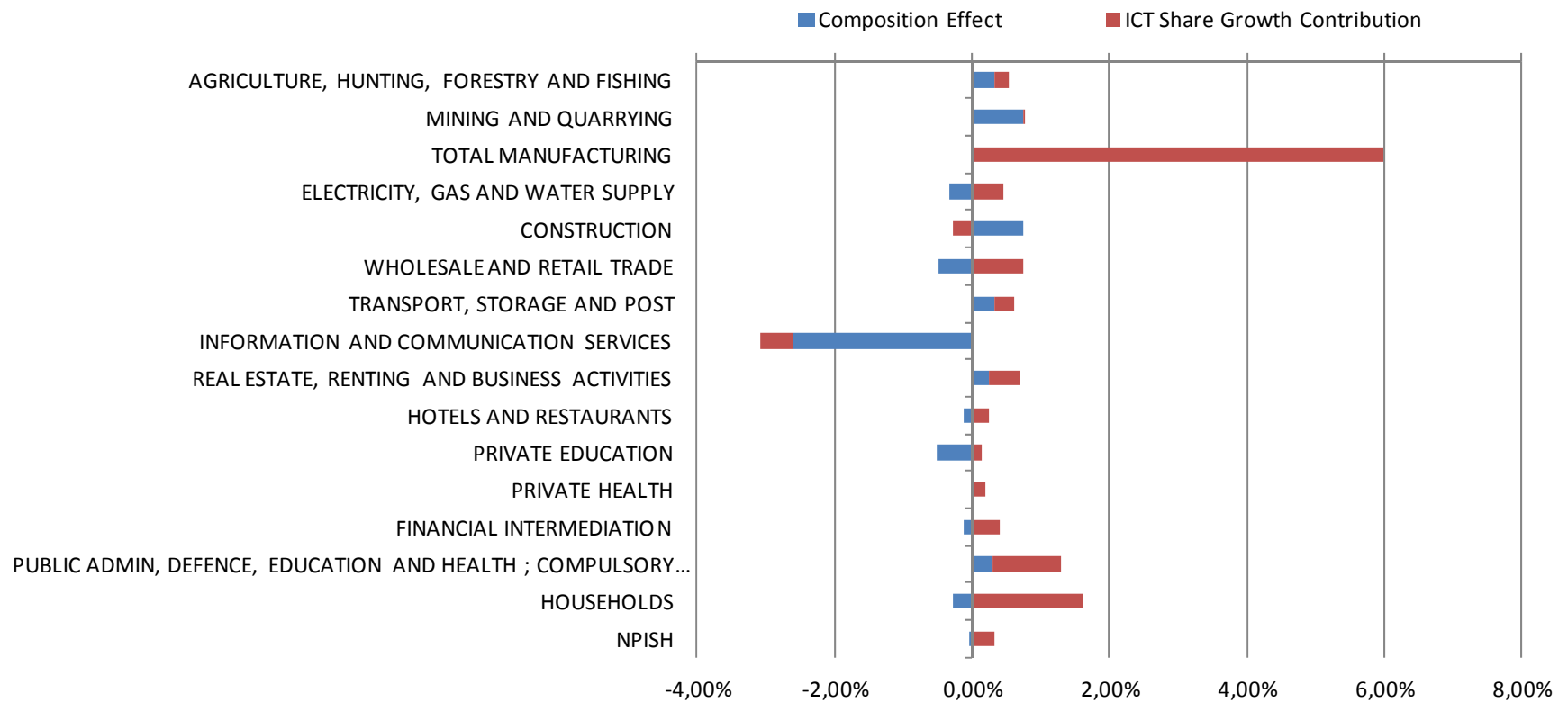


Source: BR-KLEMS

* Households and NPISH Investment excluded

Brazilian GFCF 2000-2009: Some Results

ICT Assets Growth Decomposition Analysis (2000-2008)



Source: BR-KLEMS

* Households and NPISH Investment excluded