Productivity, Taxes and Hours Worked in Spain: 1970–2015
Data Appendix

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Original Data: Description

O.1 Gross Capital Formation (millions of euros)
O.2 Taxes less Subsidies (millions of euros)
O.3 Consumption of Fixed Capital (millions of euros)
O.4 GDP (millions of euros)
O.5 GDP (millions of 2010 euros)
O.6 Compensation of Employees (millions of euros)
O.7 Households Compensation of Employees (millions of euros)
O.8 Households Gross Operating Surplus and Mixed Income (millions of euros)
O.9 Households Consumption of Fixed Capital (millions of euros)
O.10 Household Final Consumption Expenditure (millions of euros)
O.11 Final Consumption Expenditure of NPISH's (millions of euros)
O.12 Government Final Consumption Expenditure (millions of euros)
O.13 Gross Capital Formation (euros)
O.14 GDP at market prices (euros)
O.15 Real GDP (Index 1995=100)
O.16 Total Population (thousands)
O.17 Population 15–64 (thousands)
O.18 Employment (thousands)
O.19 Annual hours worked (numbers)
O.20 Taxes on income, profits, and capital gains of individuals (1100)
O.21 Taxes on income, profits and capital gains of corporations (1200)
O.22 Total social security contributions (2000)
O.23 Employer's contributions to social security (2200)
O.24 Taxes on payroll and workforce (3000)
O.25 Recurrent taxes on immovable property (4100)
O.26 Taxes on financial and capital transactions (4400)
O.27 General taxes on goods and services (5110)
O.28 Excise taxes (5121)
O.29 Population 15–64 in the United States (thousands)
O.30 Employment in the United States (thousands)
O.31 Annual hours worked per worker in the United States (numbers)

Original Data: Sources

O.1–O.12 OECD Annual National Accounts - Detailed aggregates
O.13–O.15 International Financial Statistics, International Monetary Fund
O.16–O.19 OECD Employment Statistics, at stats.oecd.org
O.20–O.28 OECD Details of Tax Revenues of Member Countries
O.29–O.31 OECD Employment Statistics, at stats.oecd.org

Constructed Series: Description

C.1 Gross Domestic Product (2010 million euros)
C.2 Gross Capital Formation (2010 million euros)

C.3 Capital Stock (2010 million euros)
C.4 Hours worked per working-age person in Spain (hours per week)
C.5 Hours worked per working-age person in the United States (hours per week)
C.6 Effective tax rate on consumption
C.7 Effective tax rate on labor income
C.8 Effective tax rate on capital income

Construction of Series

C.1 For the period 1970–2015 it is O.5. Prior to 1970 it is O.15 spliced to O.5 at 1970.

C.2 First, we compute gross capital formation at current prices. For the period 1970–2015 it is O.1. Prior to 1970 it is the O.13 spliced to O.1 at 1970. Next, we deflate this series by the GDP deflator. We construct GDP in current prices. For the period 1970–2015 it is O.5. Prior to 1970 it is O.14 spliced to O.5 at 1970. Dividing GDP in current prices by C.1 yields the GDP deflator. Finally, we divide gross capital formation at current prices 1954–2015 by the GDP deflator.

C.3 The capital stock is generated using a perpetual inventory method. Given an initial capital stock in 1954, real investment 1954–2015, C.2, is cumulated using the law of motion of capital:

$$K_{t+1} = (1-\delta)K_t + I_t .$$

with a depreciation rate of 0.0464. The depreciation rate is chosen to match the average depreciation-output ratio obtained in the data O.3/O.4 (equal to 0.1394). The initial capital stock is chosen iteratively to match the average capital-output ratio over the period 1955–1964.

C.4, C.5 We compute hours worked per working-age person in Spain as

$$\text{C.4} = \frac{\text{O.19} \times \text{O.18}}{\text{O.17} \times 52} .$$

Since hours per worked data in Spain, O.19. is not available before 1977, we use the 1977 number for 1970–1976. For the United States, we compute

$$\text{C.5} = \frac{\text{O.31} \times \text{O.30}}{\text{O.29} \times 52} .$$

C.6, C.7, C.8 The household sector has a large amount of mixed income. Unfortunately the accounts of the household sector are only available since 1999. To recover household accounts for previous periods we assume that it has been throughout the previous periods a fraction of GDP equal to the average for the available years.

We define the labor income share as unambiguous labor income divided by the sum of unambiguous labor income and unambiguous capital income. Then, we compute the aggregate economy labor income share, α, as:

$$\alpha = \frac{\text{O.6} - \text{O.7}}{\text{O.4} - (\text{O.7} + \text{O.8}) - \text{O.2}}$$

Notice that our procedure reduces to computing the labor income share excluding the household sector. We finally match model variables with data as follows in order to define the tax base:

Consumption	O.10 + O.11
Labor Income	$\alpha \times (\text{O.4} - \text{O.2})$
Net Capital Income	$(1-\alpha) \times (\text{O.4} - \text{O.2}) - \text{O.3}$

We compute the consumption tax rate as

$$\text{C.6} = \frac{\text{O.27} + \text{O.28}}{\text{O.10} + \text{O.11} - \text{O.27} - \text{O.28}}.$$

To construct labor and capital income taxes, we first compute the aggregate marginal tax rate on household's income:

$$\tau_h = adj \times \left[\frac{\text{O.20}}{\text{O.6} - \text{O.23} + \text{O.8}} \right],$$

where adj is an adjustment factor to transform average into marginal tax rates, that we assume to be 1.8. We the compute the marginal tax rate on labor income as

$$\text{C.7} = \frac{\tau_h \times [\text{O.6} - \text{O.23} + \alpha \times \text{O.8}] + \text{O.22} + \text{O.24}}{\alpha \times (\text{O.4} - \text{O.2})}$$

and the marginal tax rate on capital as

$$\text{C.8} = \frac{\tau_h \times (1-\alpha) \times \text{O.8} + \text{O.21} + \text{O.25} + \text{O.26}}{(1-\alpha) \times (\text{O.4} - \text{O.2}) - \text{O.3}}.$$