BANCO DE ESPAÑA
Eurosistema

Discussion: American Treasure and the Decline of Spain
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Disclaimer: The views expressed in this discussion are those of the author and do not necessarily coincide with those of the Banco de España or the Eurosystem.

What does the paper do?

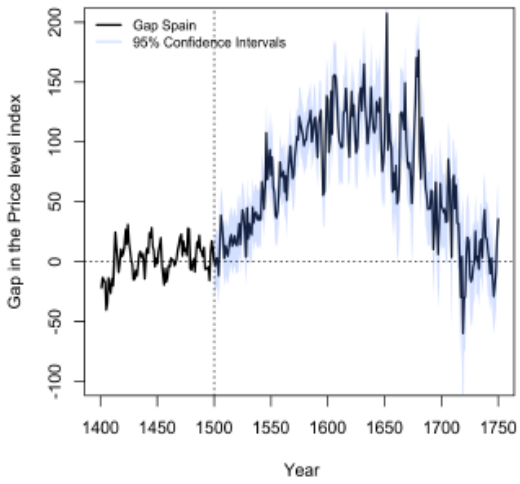
- "We rely on a synthetic control methodology to **study the long-run impact of the influx of silver from the New World** since 1500 for the economic development of Spain."

What does the paper conclude?

- "Compared with a synthetic counterfactual, the price level increased by up to 200% by the mid-seventeenth century. Spain's GDP per capita outperformed other European nations for around a century, but by 1750, GDP per capita was 40% lower than it would have been if Spain had not been the first-stage receiver of the American treasure."

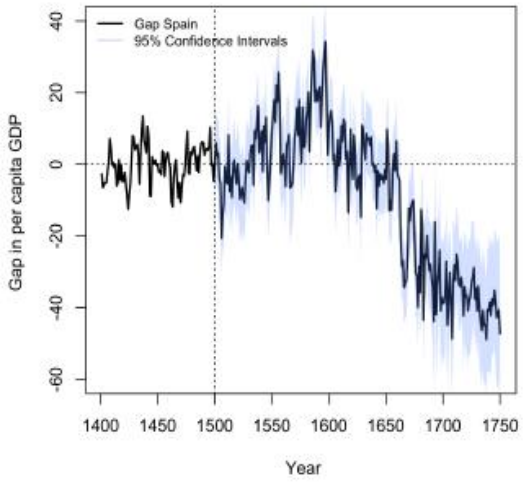
Results

Price level



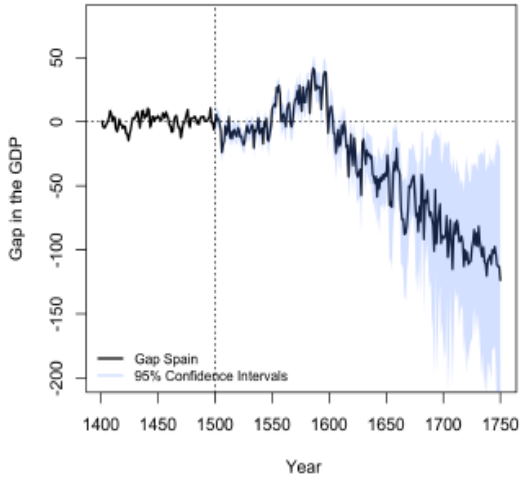
Countries	Weights
England	0.41
Sweden	0.25
France	0.35
Italy	-0.01

Per-capita GDP



Countries	Weights
England	0.73
Sweden	0.12
Italy	0.09
France	0.06

GDP



Countries	Weights
England	0.57
France	0.39
Sweden	0.06
Italy	-0.02

I will discuss the following three issues:

1. Does the SCM really identify the impact of the influx of silver?
2. The influx of silver is a gradual process.
3. More technical: Spillovers/SUTVA violation.

Issue 1: Does the SCM really identify the impact of the influx of silver?

- **Identification problem**: The influx of silver is not the only thing that differs before and after 1500.
- **Columbian Exchange**: "exchange of diseases, ideas, crops, and populations between the New World and the Old World following the voyage to the Americas by Christopher Columbus in 1492"
- **Examples** of questions that would lead to the same SCM as the question of interest:
  - We study the long-run impact of the introduction of **the potato and other crops** in European agriculture for the economic development of Spain.
  - We study the long-run impact of the **colonization of the Americas** for the economic development of Spain.

Issue 1: Does the SCM really identify the impact of the influx of silver?

Possible solution: Argue that the large increase of prices in Spain suggests that the influx of metals is an important driver of events during the period.

Caveats:

- An important driver does not mean the main driver.
- The goods baskets and production methods change with the Columbian Exchange. This might affect prices.
- The Balassa-Samuelson effect: as GDP per-capita goes up initially, the price level should do so as well.
- What does “large increase of prices mean”. Relative to per-capita GDP? Discussed later: GDP and prices do not receive the same "dose" of influx of silver

Issue 2: The influx of silver is a gradual process

- The SCM assumes that something changes discretely at some point of time.
- However, the intensity of silver flows evolves gradually
- Is the SCM the correct tool?
  1. The SCM does not take into account the intensity of the silver influx.
  2. There is no obvious cutoff date.

Issue 3: SUTVA violation

Issue: all countries ultimately receive an influx of metals (violation of SUTVA).

Solution in the paper: Use the SCM, but interpret the estimand as the difference between Spain, the initial receiver, and other countries, who receive metals in a second stage.

Problem: The assumption that countries in the donor pool are not affected by the treatment is actually a combination of **two assumptions**:

A1 The value of the treatment is the same for all countries in the donor pool.

A2 This value is zero.

- The proposed solution amounts to changing a normalization and therefore addresses A2.
- But, does A1 hold? Probably not: second-stage receivers are exposed to the influx of metals to a different degree.

Question: Can the SCM be used anyway?

Example

The SCM assumes this:

$$Y_{it} - Y_{it}^{N} = \alpha_{it} D_{it}$$

$$D_{it} = \begin{cases} 1, & \text{if } i \text{ is Spain} \\ 0, & \text{if } i \text{ is not Spain} \end{cases}$$

But the world might be like this:

$$Y_{it} - Y_{it}^{N} = \alpha_{it} D_{it}$$

$$D_{it} = \begin{cases} 1, & \text{if } i \text{ is Spain} \\ 0.3, & \text{if } i \text{ is Italy} \\ 0.2, & \text{if } i \text{ is England} \\ 0.1, & \text{if } i \text{ is Sweden} \end{cases}$$

Substituting one equation into another:

$$Y_{it} - Y_{it}^{N} = \begin{cases} 1 \times \alpha_{it}, & \text{if } i \text{ is Spain} \\ 0.3 \times \alpha_{it}, & \text{if } i \text{ is Italy} \\ 0.2 \times \alpha_{it}, & \text{if } i \text{ is England} \\ 0.1 \times \alpha_{it}, & \text{if } i \text{ is Sweden} \end{cases}$$

First consequence: An estimation based on the equation $Y_{it} - Y_{it}^{N} = \alpha_{it} D_{it}$ now implies that the impact of the treatment on outcomes must be linear, i.e., if a country receives twice the size of the treatment, then the impact on the outcome variables must double.

Graphically: The usual potential outcomes framework without SUTVA implies that the world is described by the black line, whereas the SCM with SUTVA is consistent with any of these lines.

Suppose the world is like this

$$Y_{it} - Y_{it}^{N} = \begin{cases} 1 \times \alpha_{it}, & \text{if } i \text{ is Spain} \\ 0.3 \times \alpha_{it}, & \text{if } i \text{ is Italy} \\ 0.2 \times \alpha_{it}, & \text{if } i \text{ is England} \\ 0.1 \times \alpha_{it}, & \text{if } i \text{ is Sweden} \end{cases}$$

But the paper performs the following estimation:

$$Y_{it} - Y_{it}^{S} = \begin{cases} \beta_{it}, & \text{if } i \text{ is Spain} \\ 0, & \text{if } i \text{ is not Spain} \end{cases}$$

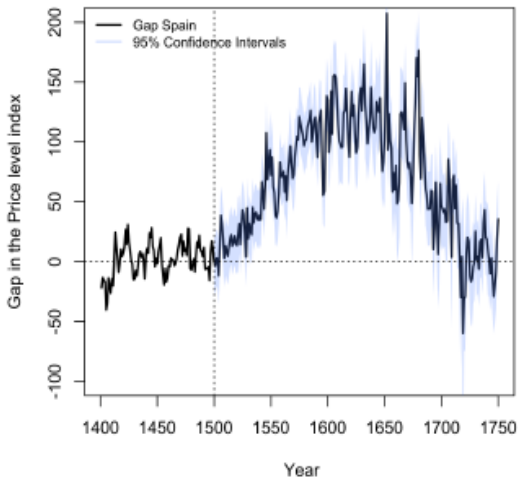
$$\beta_{it} = \alpha_{it} - \left(\omega_1 \times 0.3 + \omega_2 \times 0.2 + \omega_3 \times 0.1\right)\alpha_{it}$$

for weights $\left(\omega_1, \omega_2, \omega_3\right)$.

Problem: The estimated effect depends on weights! (Not the case with SUTVA).

Different weights imply a different "dosage" of silver influx.

Price level



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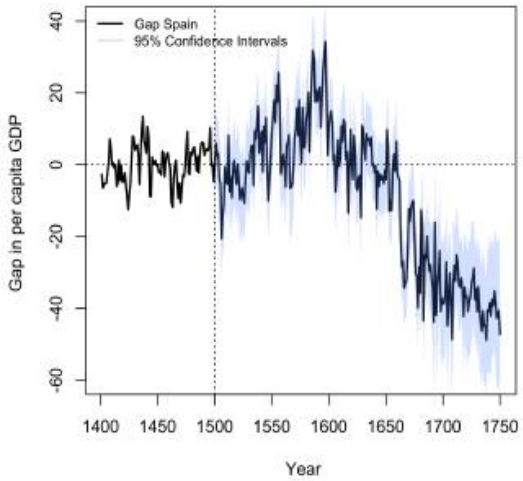

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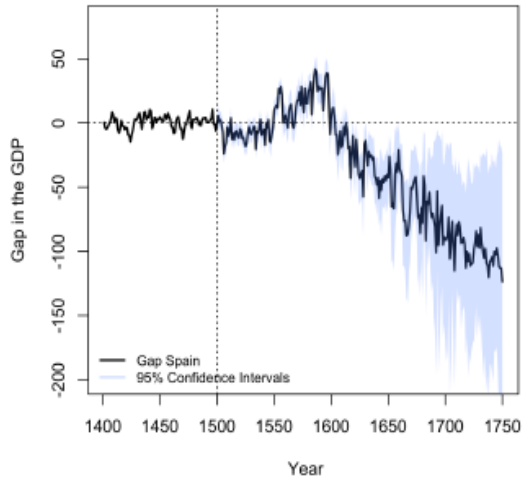

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Issue 3: SUTVA violation

- Normally, the SCM chooses weights in a data-driven procedure to minimize some objective function, but the weights do not directly affect the size of the estimated effect.
- Does the data-driven procedure in the SCM retain all its desirable properties when the weights affect the estimated effect?
- Probably not.
- Not much research on this (WP by Cao and Dowd, 2019). Applying SCMs with spillover effects seems to be an open question.