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European Booms and Busts over Six Centuries

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Abstract

We examine the impact of economic upturns and downturns on subsequent economic performance in Europe over six plus centuries. Instead of utilizing the conventional post-World War II framework, we employ a comprehensive panel of GDP data for England, Holland and Italy spanning more than 600 years. We find consistent evidence in favor of asymmetry. Downturns are followed by statistically significant higher growth rates, while upturns are followed by mildly lower growth rates which are often not statistically significant. Our finding of asymmetry suggests that business cycle properties are consistent with mechanisms similar to Friedman's plucking hypothesis.

Keywords: scarring, cleansing, economic downturns and upturns, economic growth

JEL Classification: C22, E32, E60, N10

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1 Introduction

How do economic downturns and upturns affect subsequent economic performance? While the question regards both phases of the business cycle, theoretical and empirical research has focused almost exclusively on downturns, largely overlooking the effects of upturns. Theoretically, there have been two dominant approaches that reach diametrically opposed conclusions. One, going back to Schumpeter’s (1942) ”creative destruction” process, predicts that downturns and volatility, despite their undeniable economic costs, are beneficial for long-run development because they result in productive reallocation of resources across sectors in the economy. Borrowing from Caballero and Hammour (1994), we will refer to this as the Cleansing Hypothesis. At the other end, however, a number of theoretical contributions have argued exactly the opposite, predicting that downturns are detrimental for long run growth because, for example, they can destroy promising firms before they reach their potential (Ouyang, 2009), or because even demand shocks can affect total factor productivity by altering the allocation of resources (Baqae, Farhi, and Sangani, 2024). We will refer to this as the Scarring Hypothesis.¹

Rather than focusing purely on downturns, our empirical contribution will examine the long-term effects of cyclical upturns and downturns on output growth using European country data for over 600 years.² We formally test the long-term growth effects of economic upturns and downturns using a panel setting for England (Great Britain), Holland and Italy with annual data from 1348-2010. Our sample of data clearly offers a longer time span and a much larger number of observations to test for the long-run growth effects of upturns and downturns, compared to conventional empirical studies which have tended to focus on post-World War II samples.

We first construct a rolling measure of downturn (upturn) severity using average negative (positive) change in real GDP per capita. For each country, we examine shocks to both terms and the impact on growth rates. Our empirical evaluation adopts a panel setting for the full sample. We adopt a Local Projection model to examine the subsequent economic impact, al-

¹We note for completeness that one may want to add a third, or ”conventional” view, in which there are no effects on long-run growth because business cycles and growth are determined by different economic forces. Baqae, Farhi, and Sangani (2024) refer to this as the ”common” view.

²The Cleansing and the Scarring Hypothesis can be empirically tested when considering economic downturns only. Our focus on asymmetry will consider the potential differing impact of economic upturns versus economic downturns.

lowing downturns and upturns to have different effects. We find consistent evidence in favor of asymmetry. Downturns are followed by (statistically significant) higher growth rates, while upturns are followed by mildly lower growth rates which are often not statistically significant.

This asymmetric finding suggests that business cycle properties may be more consistent with mechanisms akin to Friedman’s (1993) plucking hypothesis than Hamilton’s (1989) model. Dupraz, Nakamura, and Steinsson (2025) and Aizenman et al. (2025) are just two examples of the recent resurgence of interest in the plucking model.³ According to the plucking hypothesis, deeper recessions are followed by larger booms, whereas stronger booms are not followed by deeper recessions. The empirical evidence for plucking is limited to recent post-World War II data on US and some major industrial economies (Friedman, 1993; Sinclair, 2009). A very relevant exception is a recent paper by Hartley (2021) which uses historical panel data from the Maddison project that cover several centuries and 169 countries. Using a very different methodology from ours, Hartley (2021) also finds strong evidence in favor of the Plucking Hypothesis for advanced economies (rather than emerging economies). Our results can be considered complementary, yet distinct, to those reported by Hartley (2021). Our focus considers the case of the leading European economies over our historic sample, rather than the global or continent-wide panel considered by Hartley (2021).⁴ At different points in our sample, European economic growth was driven by one of our chosen economies, most notably Italy during the fifteenth century, then Holland during the eighteenth century and finally Great Britain during the late nineteenth century. In addition, our methodological approach, Local Projections, is also very different to the approach adopted by Hartley (2021).

The paper is structured as follows: the next section outlines the methodology, section 3 presents the data and the results, and the last section concludes.

³See Cerra et al. (2023) for a thorough survey.

⁴In another recent paper, Donayre and Panovska (2021) provide US evidence for asymmetric recovery following a recession which may be U- or L-shaped or in between these two extreme cases. However, this study does not consider the likely asymmetry arising from the impact of upturns versus downturns on subsequent growth.

2 Methodology

We adopt the Local Projection (LP) methodology (Jordà, 2005) to examine the impact of economic downturns/upturns on subsequent growth performance.⁵ The downward severity and expansion strength series are calculated for each of the three economies over the entire time period.⁶ We compute rolling measures of the average negative (positive) change in real GDP per capita growth over decade-long rolling windows.⁷ Specifically, we define downward severity and expansion strength, respectively, by equations (1) and (2) below

$$\overline{sev}_{i,t} = \sum_{s=t}^{t+9} \frac{|dy_{i,s}^-|}{10} \quad (1)$$

and

$$\overline{str}_{i,t} = \sum_{s=t}^{t+9} \frac{|dy_{i,s}^+|}{10} \quad (2)$$

where

$$dy_{i,t}^- = \min(dy_{i,t}, 0)$$

and

$$dy_{i,t}^+ = \max(dy_{i,t}, 0)$$

⁵The properties of Local Projections, and the relationship with VAR methodologies, have been analyzed by Plagborg-Møller and Wolf (2021); Li, Plagborg-Møller, and Wolf (2024); Jordà (2023); and Jordà and Taylor (2025).

⁶Our measures of downward severity (expansion strength) rely on the growth rate of GDP per capita. To ensure robustness, we also constructed alternative measures of both variables using deviations from the trend based on the Hodrick-Prescott filter. Results are consistent with those reported below and are available upon request.

⁷We also experimented with different lengths for the rolling window, such as 5 years. Our results presented below are robust to these alternative lengths of the rolling window.

Thus, $dy_{i,t}^-$ and $dy_{i,t}^+$ capture negative and positive changes in real GDP per capita, respectively. Note that (1) and (2) take the absolute value of the negative changes, so our downturn severity measures are by construction positive. The LP model examines the effect of downturn severity (expansion strength) on subsequent growth, estimated for each horizon h . The panel regressions for downturn severity and expansion strength are given by equations (3) and (4), respectively

$$\begin{aligned} \overline{dy_{i,t+10+h}} &= w_i^h + v_t^h + \delta^h \overline{sev_{i,t}} + \sum_{j=1}^J \delta_j^h \overline{sev_{i,t-j}} \\ &+ \sum_{j=1}^J \gamma_j^h \overline{dy_{i,t-j}} + u_{i,t} \end{aligned} \quad (3)$$

$$\begin{aligned} \overline{dy_{i,t+10+h}} &= x_i^h + z_t^h + \beta^h \overline{str_{i,t}} + \sum_{j=1}^J \beta_j^h \overline{str_{i,t-j}} \\ &+ \sum_{j=1}^J \alpha_j^h \overline{dy_{i,t-j}} + u_{i,t} \end{aligned} \quad (4)$$

where w_i^h , x_i^h , v_t^h , and z_t^h are (country and time) fixed (or random) effects, and Impulse Response Functions (IRFs) are obtained by the estimated δ^h s and β^h s.

3 Data and Empirical Results

Our sample of data covers the period 1348 to 2010, for GDP per capita for England (Great Britain), Holland and Italy. Our source for each of our country data sets are for England (Great Britain) is Broadberry, *et al.* (2015), for Holland it is van Zanden and van Leeuwen (2012), and for Italy it is Malanima (2011). At different points throughout our extensive panel, each of our chosen countries were considered to be Europe's leading economy. This was the case for Italy during the fifteenth century, then Holland during the eighteenth century and finally Great Britain during the late nineteenth century. While business cycle analysis has been examined for a broader set of European countries, see Broadberry and Lennard (2024), we focus on Europe's leading economies throughout our sample. Details on the dataset, issues of economic convergence/divergence and country specifics are developed in Fouquet and Broadberry (2015). Our measure of output is real GDP at factor cost and we draw on a number of data sources. Complete details on the data and the data sources is included in Bredin *et al.* (2025). Our measures of both upturns and downturn severity rely on the growth rate

of GDP per capita. To ensure robustness, we also constructed alternative measures of both variables using deviations from the trend based on the Hodrick-Prescott filter. Positive and negative changes using both measures are presented in Figure 1 and 2, indicating broad consistency between the two measures.

In Figure 3, we present the IRFs from model (3): the estimated response of subsequent economic growth to a downturn severity shock.^[8] Recall that our definition uses the absolute value of negative growth changes for the definition of downturn severity, so a larger positive shock indicates a deeper downturn. Figure 3 reports IRFs from specifications with fixed or random effects, and with or without autoregressive terms. The estimated IRFs imply that a downturn severity shock results in higher subsequent growth in GDP per capita. The effect is both statistically and economically significant and robust to all specifications. Our results are certainly not consistent with the Scarring Hypothesis and while we do not formally test for the Cleansing Hypothesis, our results point to evidence consistent with cleansing throughout the six century period in Europe.^[9]

To investigate symmetry, Figure 4 presents the IRFs for shocks to economic upturns from model (4). These responses paint a very different picture. While we find that economic expansions are followed by lower levels of growth, these effects are much less sizable (and often not statistically significant) compared to those in Figure 3. To visualize the asymmetry, Figure 5 reports responses to both downturn and upturn shocks for the case of fixed effects with AR terms. Effects on subsequent growth are about three times larger for downturn shocks than for upturn shocks, and remain statistically significant for twice as long. Our historical finding in relation to asymmetry aligns very closely to the Friedman Plucking Hypothesis and our results are consistent with the recent formal test results of the Plucking Hypothesis, see Dupraz et al. (2025).^[10] In addition, our results also complement those results reported recently in the economic history literature.^[11] For example,

⁸All IRFs are accompanied by two-standard deviation bands indicating 95% confidence intervals.

⁹Given our focus on historical data, we are unable to formally test for the Cleansing Hypothesis. See Caballero and Hammour (1994) for a theoretical and empirical evaluation of the Cleansing Hypothesis.

¹⁰Dupraz et al. (2025) refer to the "plucking property" and define it as "the following asymmetry: economic contractions are followed by expansions of a similar amplitude [...] while the amplitude of contractions are not related to the previous expansion".

¹¹We have also considered the individual country case. Our findings of asymmetry are also evident when we examine England (Great Britain), Holland and Italy individually, although the later country results are prone to statistical imprecision.

Broadberry and Wallis (2025) find that modern economic growth in Europe, from the eighteenth century onward, is the result of a reduction in the frequency and the rate of economic downturns (as opposed to higher economic growth as one might have expected). While, Broadberry et al. (2023) find that business cycles in the UK over the last 300 years are consistent with *tick-shaped* recessions, that is short contractions and long recoveries.

In the very long time period of our data set, both the underlying structure of the economies we examine and the nature of the "shocks" causing expansions and downturns have experienced substantial changes.¹² Data limitations prevent us from using information on relevant variables such as sectoral employment shares, but we address this issue in an alternative way by splitting our six-century-long time period into four sub-periods, which, following the classification of Broadberry et al. (2015), are the Medieval (1348-1499), Early Modern (1500-1699), Industrial (1700-1869), and Modern (1870-2010) periods. Estimating our models separately for each sub-period allows changes in the underlying economic structure to produce different responses to expansions and contractions, relaxing the restriction imposed by the unified sample. The results for the four sub-periods are reported in Figure 6, with our asymmetric finding being quite robust across all four sub-samples. While the Modern period stands out in having a somewhat different pattern, the asymmetry on which we base our conclusions is present in all four sub-periods.¹³ Considering the enormous changes in economic structure across these periods, we believe this robustness is a valuable result.

4 Conclusions

We investigated how economic growth is affected by economic downturns and upturns. Unlike most of the existing literature, which focuses on the post-WWII period, we utilized a very long panel data set covering roughly

¹²We are grateful to two anonymous referees of this journal for independently raising this issue.

¹³For the Medieval, Early Modern, and Industrial the downturn (expansion) is followed by positive (negative) economic growth, which subsequently falls (rises). For the case of the Modern period, the behavior is quite different with the positive growth following the downturn staying constant and only falling slowly, while the magnitude of the negative growth is small and not immediately statistically significant following the expansion, but there is evidence of some persistence. Potential justifications for the latter result may include early adoption of stabilization policies across Europe or structural economic changes during the late nineteenth and early twentieth century.

seven centuries (1348-2010) for the economies of England (Great Britain), Holland and Italy. Our results consistently indicate evidence of asymmetry in relation to the effect of downturns/upturns on subsequent economic growth. While downturns are followed by higher and statistically significant growth rates for two to three years, expansions are followed by mildly (and often statistically insignificantly) lower growth rates. This asymmetry aligns with the "plucking property" (Dupraz et al. 2025), lending support to Friedman's (1993) plucking hypothesis.

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Figure 1

DY Positive and Negative Changes

1348-2010

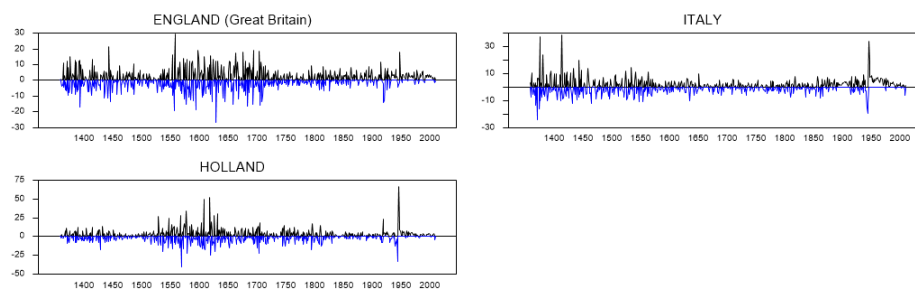


Figure 2

HP Positive and Negative Changes

1348-2010

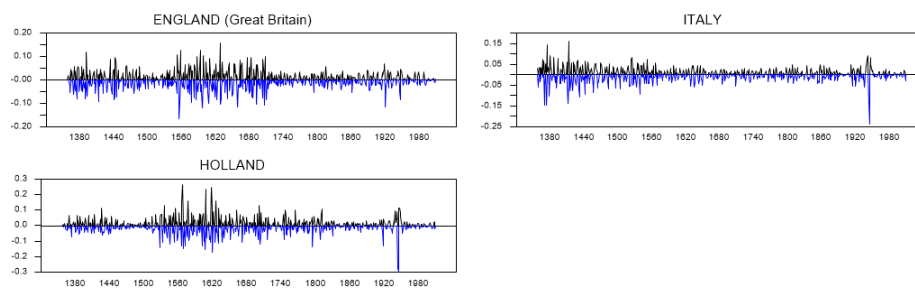
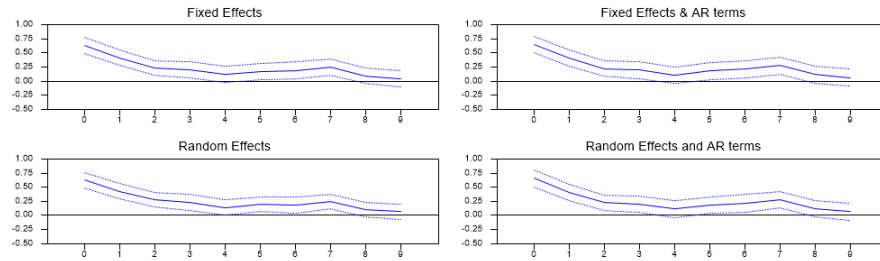


Figure 3

Response of Growth to Downturn Severity

Full Panel 1348-2010

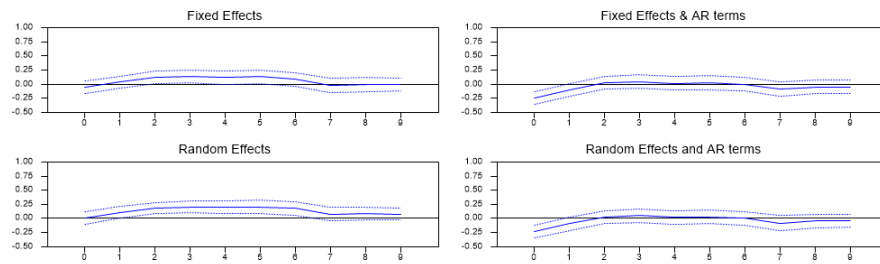


Notes: Downturn severity measures are (absolute values of) averages of negative changes (decreases) in real income per capita over 10-year long rolling windows.

Figure 4

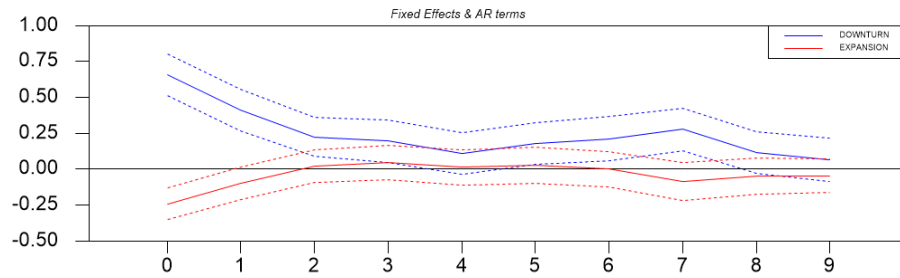
Response of Growth to Expansion Strength

Full Panel 1348-2010



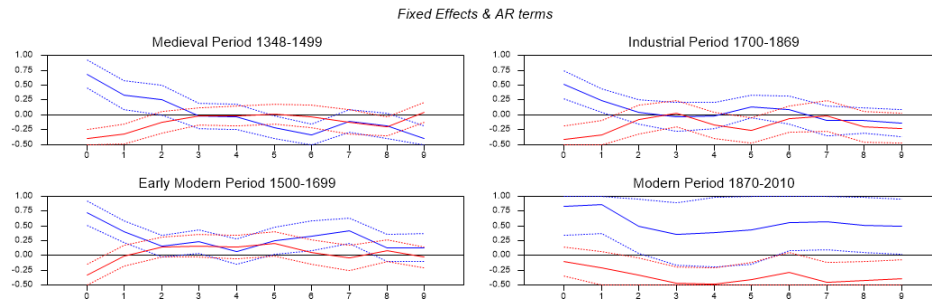
Notes: Expansion strength measures are averages of positive changes (increases) in real income per capita over 10-year long rolling windows.

Figure 5
Response of Growth to Downturn Severity and Expansion Strength



Notes: Downturn severity measures are (absolute values of) averages of negative changes (decreases) in real income per capita over 10-year long rolling windows. Expansion strength measures are averages of positive changes (increases) in real income per capita over 10-year long rolling windows.

Figure 6
Response of Growth to Downturn Severity and Expansion Strength



Notes: The individual samples are indicated in each panel. The blue lines correspond to downturns and the red lines to expansions.