Commodity Prices and the Business Cycle in resource-dependent Countries

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Contents

Abstract

Introduction

Methodology

Data

In pursuit of a scientifically sound foundation to build further analysis on, the initial concern of this paper was the definition and selection of *resource-dependent* countries. To avoid arbitrariness this was done in a data-based manner. For this, World Bank data on economic variables, resource rents and metal exports were utilised in the creation of four indicators of resource-dependence. These are the ratios of subsoil wealth to GDP, natural to total wealth, resource rents to GDP and metal exports to total exports. Together with constraints on size of the economy and ultimately data availability, these indicators were used to single out Australia, Chile, Norway and South Africa for our analysis. The major source for economic data was the OECD, with timeseries of quarterly GDP, trade, consumer prices, interest rates and many more. While a wide array of data is readily available, length and frequency of timeseries and comparability between countries posed some challenges. E.g. vital timeseries on monetary policy rates were mostly gathered from national central banks and - in the case of Australia and Norway - had to be extended with short-term interbank rates. Data on unemployment rates, exchange rates and other economic indicators were dropped due to issues with heterogeneity and availability. Market data was gathered via Bloomberg and Datastream and includes over forty commodity indices, individual resource prices and equity indices. However, the bulk of these timeseries only started in the 1990s, highlighting the dilemma of longevity versus abundance of data. For a more detailed overview of used data and its sources please consult Table 10.1 in the appendix.
To achieve stationarity the variables, apart from interest rates, were transformed. Three different approaches were up for consideration - namely first-differences, log-differences and a Hodrick-Prescott filter. Of these, log-differences seemed to perform the best, with the exception of GDP, which was filtered via an HP filter, and the principal components of the resource data, where first-differences were applied.

Vector Autoregressive Models

Variable Selection

Computation

Results

Variable Structure

SSVS results, hypothesise, expectations

Impulse Responses

The impulse responses, as pictured in Plots 3.1 and 3.2 (as well as Plots 17.1 - 17.6) show us the reaction of the model's variables in the rows to specific shocks, per column. The solid black line corresponds to the mean response; the dark- and light-gray areas cover 25-75 percent and 16-84 percent posterior confidence intervals among the 10,000 iterations.
In very loose terms the results do not hold any huge surprises. Technology shocks roughly turn out as expected, and do so rather significantly. In the cases of inflation and monetary aggregates the responses are pronounced, but dissipate very quickly. The picture is a similar one for monetary policy shocks, although the progression is harder to pinpoint due to broader confidence intervals. The impact of a a shock to the first

principal component (labelled *comm*) impacted GDP negatively in all countries, but Chile. The impacts on export were negative for all resource-dependent economies, but positive on the control-group of Germany and the US. The monetary policy rate reacted in an expansionary matter in Australia and the US, but insignificantly or contractionarily for the other countries. In Germany and South Africa we can also observe a short, but significant jump in equity prices as a reaction to a shock on this first principal component. The second principal component (labelled *industr*) did not affect GDP as consistently, although for it, the initial effect was positive for all, but Chile. In the control group the positive GDP response even increased for some time and only faded after a considerable amount of time. In the resource-dependent countries the responses peaked rather early and quickly tended to insignificance. Meanwhile, the responses of inflation, bond-yields, monetary aggregates and the monetary policy rates differed between countries, but turned out extremely similar in each country itself. Exports jumped significantly for about eight quarters in Australia and South Africa. In Germany and the US exports fell significantly, only to rebound to a small but significant increase after about four to six quarters. The shock only had a a significant, positive effect on equity prices in South Africa.

Another set of models with country-specific commodities instead of principal components was estimated for comparison. These include industrial metals, agriculture and livestock, gold, copper, energy and precious metals (see appendix, Table 11.1). The resulting impulse responses were largely comparable, but the impacts and responses of commodity variables turned out rather insignificant. Ultimately this appraoch yielded less convincing results than one that simply used a single commodity price index. We interpret this as evidence for our approach of using principal components, as it combines the advantage of both approaches - the use of all available data, including rather country-specific timeseries, and the impactfulness of using few, but significant variables.

Discussion

Literature

Appendix