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Oil: a price with many implications

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At first sight, the impact of low oil prices seems simple enough: producers and net exporting countries are the losers, consumers and net importers the winners. This is in fact the case as far as the initial impact on oil exporters' revenues and importers' expenditure is concerned.

However, further effects depend on the initial state of the economy concerned and any room for manoeuvre on economic policy. At first, there is an impact on private consumption and companies' production costs but there are also effects on government revenues, government spending and – given the impact on inflation – monetary policy. In general, however, it may be assumed that a fall in oil prices has less impact than an oil price rise and that oil price effects have declined since the 1970s.

The annual average oil price in the years 2011 to 2013 was around USD 104 per barrel. A price increase of almost 270% since the year 2000 – interrupted only by the global recession in 2009 – thus came to a halt. The fall in the oil price since mid-2014, to less than USD 50 per barrel at one point, is remarkable for its speed and size. This gave rise to an extensive analysis of the implications for the global economy and for individual countries' economies.

The price decline is attributed largely to an oversupply of oil, rather than to weakening demand. The IMF, for example, considers the effects on the world economy to be positive overall. However, this positive outlook relays a very uneven picture of winners and losers from the fall in the oil price, depending on the initial

situation of the country concerned and anticipated economic-policy reactions.

Initial impact: redistribution away from net exporting countries towards net importing countries

In 2013, exports of crude oil and related products were worth 3.7% of global GDP. If the oil price had been USD 50 per barrel lower – which was roughly the size of the fall in the oil price between June and December 2014 – oil importers would have paid around 1.7% of global GDP less. Oil exporters' income would have been reduced to the same extent. Since most countries both export and import oil products, the redistribution away from net exporters towards net importers for the same price effect is smaller, at around 1% of global GDP.

Far fewer countries are net exporters than net importers of oil (see Figure 1) and these account for only about 14% of global GDP. The negative impact on net

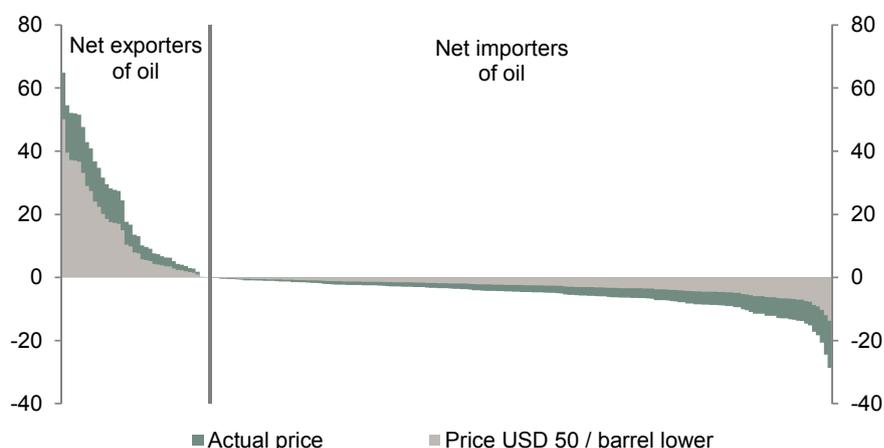
exporting countries is therefore more concentrated. The loss for a net exporting country is on average 4.5 times larger than the gain for a net importing country.

Clear initial impact on current account balance

The current account balance of net exporting countries is far more dependent on oil exports than the current account balance of net importing countries is dependent on oil imports. A variation in the oil price therefore affects the current account balance of net exporting countries much more strongly. As well as major producers like the Gulf States and Russia, this also includes African countries such as Equatorial Guinea, Congo or Angola.

Some net exporting countries have a substantial current account surplus relative to GDP (see Figure 2). Exceptions among the major net exporting countries in 2013 – before oil prices fell – included Kazakhstan (current account balance of -0.1% of GDP), Iraq (1%), Russia (1.6%), Algeria (0.4%) and Canada (-3.2%). It is estimated that just under a third of net exporting countries would have moved from a current account surplus to a current account deficit if the oil

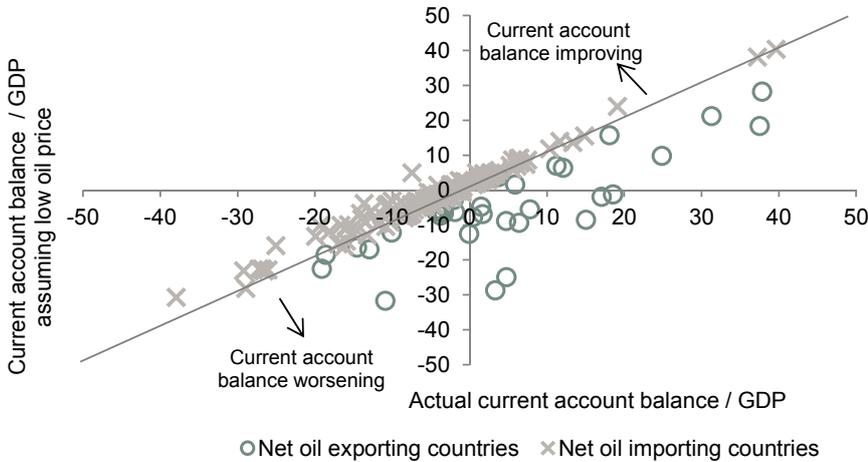
Figure 1: Net exports of crude oil and related products (nominal, in per cent of GDP)



Comments: Data available for 195 countries, data for 2013.

Source: UNCTAD, own calculations.

Figure 2: Current account balance with actual and assumed oil price (in per cent of GDP)



Note: Data available for 36 net exporting and 145 net importing countries, data for 2013, net balance.

Source: UNCTAD, own calculations.

price had been USD 50 lower in 2013 and if possible adjustment processes, such as changes in exchange rates or export volumes, are ignored.

For net importing countries, all else being equal, the improvement in the current account balance brought about by a lower oil price would have been considerably smaller. It is estimated that only 16% of the countries with a current account deficit would have moved into a current account surplus as a result of a respectively lower oil price.

The above analysis assumes that, although the oil price changes, the traded quantities remain the same, so that only price-induced changes are taken into account. This seems justified because crude oil consumption is less volatile than crude oil prices and demand for oil is not very price-sensitive in the short term.¹ Demand for petrol, for example, offers a textbook example of price-inelastic demand, which is empirically confirmed in the short term.²

Crude oil consumption relative to GDP is in long-term decline

A second dividing line when considering oil price effects is between consumers and producers of oil and related products. Around 2.2% of global GDP is redistributed from producers to consumers if the oil price falls by USD 50. The effect is more pronounced than for the redistribution between exporting and importing

countries, as not all the oil produced is traded across national borders.

Petroleum products are consumed both by households and by companies. For private households, a lower oil price means higher real disposable income and for businesses it means lower costs, if oil-based consumer products such as petrol and oil-based input factors of production become cheaper. The strength of the direct effects depends firstly on the extent to which the fall in the oil price is passed on to the prices of consumer goods and input factors and secondly on what percentage of consumer baskets and production input factors these goods account for.

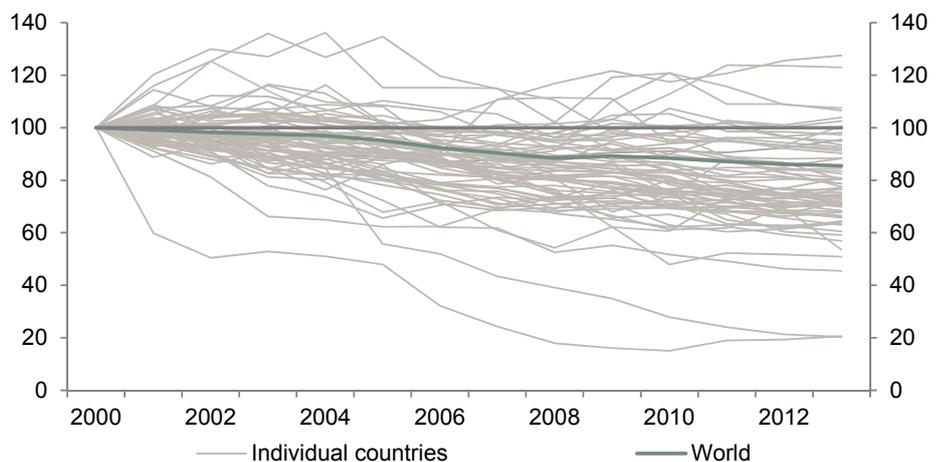
An initial idea as to the size of the direct effects can be gained by examining the oil intensity of real GDP, that is to say, the quantity of oil consumed per unit of real GDP. After the oil price shocks of the 1970s, this declined by around 54% up to the year 2000. Since then, the oil intensity of real GDP has fallen by a further 15% on a global average. Only a few of the 67 countries considered have increased their oil intensity compared with the year 2000 (see Figure 3). It thus seems plausible that the impact of oil price shocks on output has diminished.³

A closer look at the effects on private consumption and production

The effects of lower oil prices on economic output depend firstly on whether they are caused by a fall in demand or by oversupply in the oil market. The current phase of low oil prices is attributed more to supply side factors, leading to an expectation that real economic activity will be positively impacted from a global perspective. In case of waning demand, on the other hand, the falling oil price would be a symptom of flagging economic performance, with little prospect of any stimuli for a revival of global economic activity.

However, a fall in oil prices is thought to have a smaller impact on economic performance than an oil price rise. This is due to possible negative effects, such as shifts in production between sectors because of changing consumption patterns, which can also occur when prices fall.

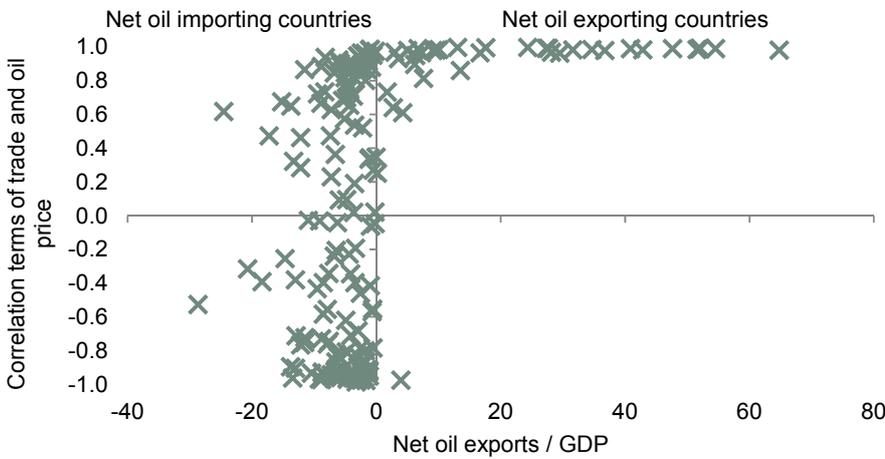
Figure 3: Oil intensity of real GDP (index 2000=100)



Note: Annual data 2000–2013. Data available for 67 countries.

Source: BP, UNCTAD, own calculations.

Figure 4: Correlation between terms of trade and oil price



Note: Annual data 2000–2013. Data available for 37 net exporting and 153 net importing countries.

Source: UNCTAD, IMF, own calculations.

These counteract the basically positive effects of lower production costs. In the three sections below, we consider in more detail the effects of lower oil prices on the level and composition of private consumption and on the output of companies.

a) Spending on energy as part of private consumption: level of consumption

Lower import prices for crude oil improve the price ratio of exports to imports for countries that are net importers. This terms-of-trade effect means that households' real disposable income increases. For net exporting countries, the opposite

argument applies. Since the terms of trade are also influenced by other variables, the correlation with the oil price varies among the net importing countries and, contrary to expectations, the effect may even be positive based on annual data (Figure 4). For the oil exporters the correlation is, as one would expect, strongly positive, given the importance of oil exports as a proportion of total exports.

In both net exporting and net importing countries, if oil prices fall, the part of household income that is available for consumption after paying energy bills should increase. This depends on the

prices in question being flexible and not subject to controls or fixed through subsidy.

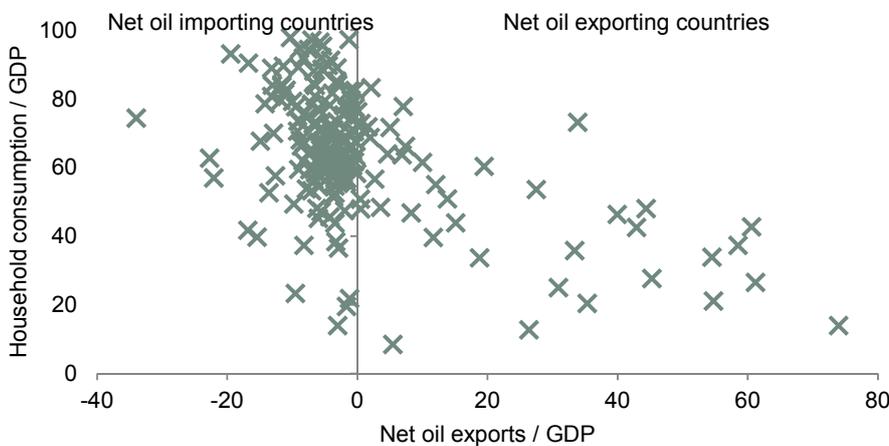
Even in industrialised countries with well-developed financial systems, liquidity and credit constraints must be assumed to exist that prevent a stable level of consumption for private households. Therefore, a higher disposable real income should have positive effects for real private consumption in net importing countries. Private household consumption does in fact normally respond to cash flow or disposable income.⁴ For net exporting countries, on the other hand, it is virtually impossible to predict the overall effect beforehand, in view of contrary effects resulting from the terms of trade and lower consumer prices.

Private households may save their windfall gains from lower oil prices rather than spend them on higher consumption. So argues the World Bank, for example, describing the precautionary motive for saving in a world of greater uncertainty after the financial market crisis. A rise in the savings rate is in fact observable in the wake of the global recession.⁵ However, for a lower oil price to justify a higher savings rate, it would have to generate additional income uncertainty. This can happen if the oil price decline leads to inter-sectoral reallocation, as observed at least in the United States.⁶ Households might then face greater job and hence income uncertainty, prompting greater saving. In general, however, the precautionary savings motive is considered to play only a minor role.⁷

Developing countries with a large informal labour market, a tendency to weak institutions and difficulty in accessing formal credit for companies are to be considered separately. In these countries a negative correlation between uncertainty – in the sense of macroeconomic volatility – and saving may also even be observed. The decision of households whether to save or consume is intertwined with the decision of small and informal businesses whether to invest.⁸ For households without access to formal savings facilities in countries with weak institutions, investing in small, informal businesses represents a way of saving.

The impact on consumption ultimately

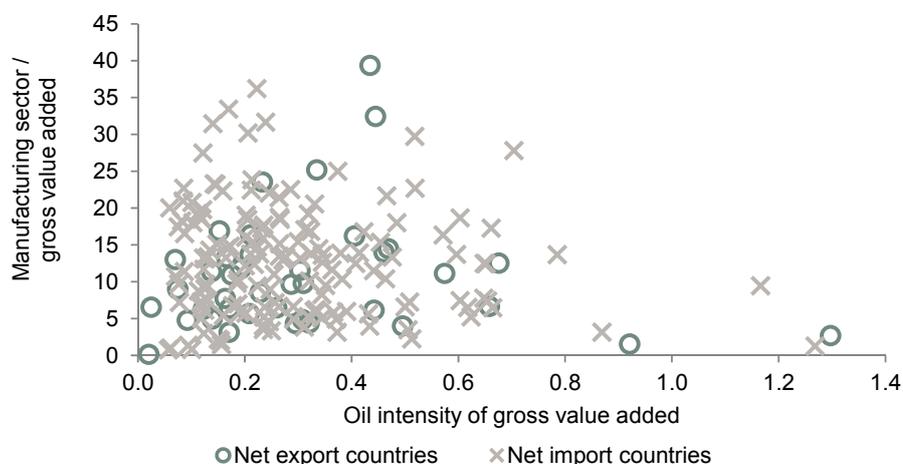
Figure 5: Private consumption and net oil exports (in percent of GDP)



Note: Data available for 196 countries (excluding Haiti, Sao Tome and Principe, Liberia, Burundi and Kyrgyzstan with consumption rates greater than 100%), data for 2012.

Source: UNCTAD, IMF, own calculations.

Figure 6: Oil intensity of gross value added and manufacturing sector's share of gross value added (in percent)



Note: Data available for 195 countries, data for 2012.

Source: UNCTAD, own calculations.

depends on households' propensity to spend. In net oil exporting countries this is typically lower than in net oil importing countries (see Figure 5). Consequently, all else being equal, the change in household consumption caused by lower oil prices – possibly amplified by precautionary saving – will be greater in net importing than in net exporting countries.

b) Spending on energy as part of private consumption: consumption patterns

In the short term, variations in the oil price are likely to affect household spending on electricity, gas and other domestic fuels, transport (motor fuels) and possibly transport services. These spending categories account for widely varying proportions in the consumer basket even within Europe, ranging from 10% in Cyprus to 20% in Slovenia (source: Eurostat).

However, since only part of these spending categories is linked to the oil price, the direct impact is found to be limited, though studies on the relationship between oil prices and economic output relate primarily to industrial countries.⁹ Nevertheless, a low oil price can also have an impact on private households' consumption patterns. This is firstly because consumption smoothing takes place primarily through the purchase of durable consumer goods and secondly because this mainly concerns durable

consumer goods that require the use of petroleum products, notably cars.¹⁰

The resulting sectoral reallocation is thought to play a significant role in the indirect effects of the oil price on economic output. This is likely to be greater than the direct effects.

c) Cost factor in industry

Oil is used as an input factor in industry and in the provision of services. A lower oil price translates into a positive supply effect, particularly in the transport sector, the petrochemical industry and agriculture (because of transport of agricultural products and operation of agricultural machinery) and in certain manufacturing sectors.¹¹ On a global average, the industrial sector is the most energy-intensive, followed by agriculture and the service sector.¹² However, no distinct correlation can be found between the oil intensity of an economy and the manufacturing sector's share of gross value added (see Figure 6).

As with private consumption, however, a variation in the oil price is expected to have only a small direct impact, as oil accounts for only a small percentage of the costs of producing goods and providing services.¹³ In this case, other effects of a variation in the oil price must be considered in order to show that oil price variations have at least a theoretically greater impact on output.¹⁴ It is argued, for example, that companies add large

and time-varying premiums to their costs when setting prices and that oil (products) and capital goods are used in complementary ways in production.

Indirect effects also occur when consumers change their demand behaviour, inducing shifts in value added between sectors. Since capital goods and above all labour cannot be transferred between economic sectors without friction, losses must be expected whether these are triggered by a rise or a fall in the oil price.

If a decrease in the oil price also increases uncertainty about oil prices and the cash flow of investment projects depends on oil prices, companies will be reluctant to invest. This counteracts the positive cost-saving effect of lower oil prices.

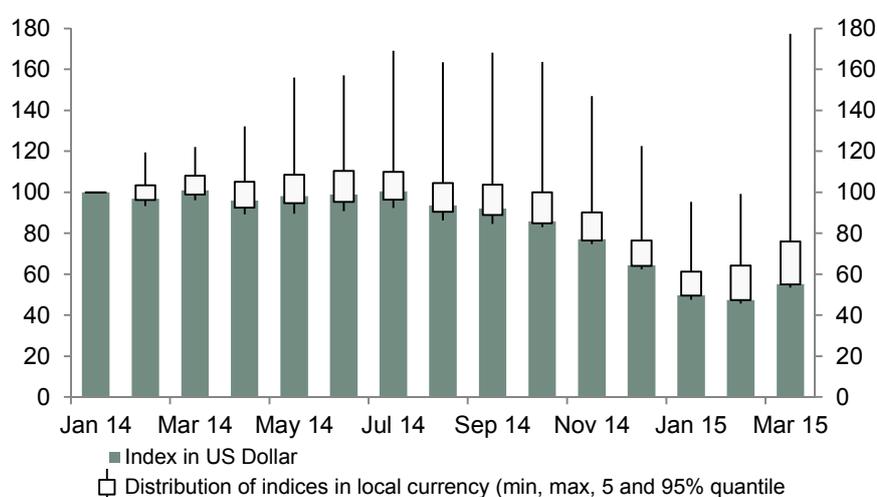
A chance to reform public finances

The effect of lower oil prices on the output of an economy also depends on the country's fiscal policy response. This highlights the impact on public finances. The price of oil affects the public finances of oil exporters on the revenue side but it is also relevant to importers on the expenditure side through energy subsidies.

For net exporting countries, government revenues from oil (and gas) are extremely important. Among the main exporters, these range from 74% of GDP in Iraq to 7% in Iran.¹⁵ On the one hand, the effect of lower oil prices depends on the design of the tax system (whether excavation tax or export tax is levied). On the other hand, currency depreciation may cushion government revenues against losses.

Government spending on petroleum subsidies is substantial in some cases, particularly in the Gulf States (for example, 14% of GDP in Iraq, 13% in Saudi Arabia) and among importers such as the United States at 2% of GDP, India (2%) or Indonesia (4%).¹⁶ A low oil price can be used to reduce these subsidies and bring about structural changes or to facilitate reforms already in progress (see also KfW Focus on Economics no. 89 "An end to energy subsidies in developing countries and emerging markets - if not now, then when?").

Figure 7: Oil price development in domestic currency and USD (indices Jan 2014=100)



Note: 149 countries, Crude Oil-Brent Dated FOB (in USD/barrel) used to calculate the oil price index. The maximum is recorded by Venezuela up to February 2015, by Ukraine in March 2015.

Source: Thomson Reuters Datastream, own calculations.

Even before the oil price fell, seven of the fifteen most important net exporting countries¹⁷ recorded budget deficits (e.g. Venezuela -15% of GDP, Iraq -6%, Nigeria -2%; source: IMF), so that the low oil price exacerbated existing problems with public finances. Whether a fall in revenues leads to cuts in public spending depends on how much room there is for fiscal policy manoeuvre. A low level of public debt and/or the existence of a state oil fund helps offset loss of revenue.

Does lower inflation for net importers represent an additional benefit?

With flexible exchange rates, oil exporters' currencies should depreciate against the dollar, causing inflation to rise. Oil importers, on the other hand, can expect their currencies to appreciate and inflation to fall. Normally, lower inflation rates for net importing countries due to lower energy prices would be an additional

gain, while higher inflation would be an additional burden on the economies of exporting countries.

However, exchange rates are not determined by the oil price alone. The US dollar strengthened all over the world during the period in question, so that both net importers' and net exporters' currencies depreciated for the most part. As a result, the oil price index in all the considered countries stood below its July 2014 level in local currency as well. However, in most countries the price fall is not as large in the domestic currency as it is in dollars (see Figure 7). In Venezuela, the price index has actually risen very significantly due to a sharp devaluation of the currency. Ghana and Russia have also in principle been able to halt the downward trend of oil prices in the local currency.

A systematic monetary policy response

to oil price shocks is thought to have played an important role in the declining effect of such shocks.¹⁸ Whether and how strongly monetary policy responds to changing energy prices depends firstly on which variable the central bank focuses on – for example, actual inflation, core inflation and/or inflation expectations. Secondly, the reaction depends on how strongly these variables react to changes in the oil price. Each country faces different transmission mechanisms between oil prices and inflation because of different wage-setting behaviours and competitive situations.¹⁹ In the Eurozone, due to concerns over deflation and low interest rates, falling energy prices and the associated downward pressure on inflation are currently making monetary policy more complicated.

Summary

Variations in the oil price attract great attention, particularly when they are on the scale seen in the last nine months. Estimates of the worldwide impact focus to a very large extent on the implications for global GDP. The multitude of offsetting effects make it difficult to arrive at a general estimate of the direction and in particular the level of impact on individual countries. It is also difficult, when looking beyond the initial impact, to make a general distinction between net importing and net exporting countries. Instead, the situation must be considered in each country separately. However, it tends to be the case that oil price reductions affect economic output less strongly than oil price increases.²⁰ Having said that, many studies relate to industrialised countries, so that further information is needed in this respect. ■

¹ Hamilton, J. D. (2008), Understanding Crude Oil Prices, NBER Working Paper No.14492.

² Sterner, T. (2007), Fuel taxes: An important instrument for climate policy, Energy Policy 35 (6) 3194–3202.

³ Weltbank (2015), Understanding the Plunge in Oil Prices: Sources and Implications, Global Economic Prospects 2015, 155–168.

⁴ Evans, P. and G. Karras, (1996), Private and government consumption with liquidity constraints, Journal of International Money and Finance 15 (2), 255–266.

Bacchetta, P. und S. Gerlach (1997), Monetary Policy and Financial Markets, Consumption and credit constraints: International evidence, Journal of Monetary Economics 40 (2), 207–238; For emerging countries refer to the summary in Khan, A. Q., Azam, M. and M. E. Qureshi (2014), Analysis of consumption behaviour concerning current income and lags consumption: Empirical evidence from Pakistan, Review of Contemporary Entrepreneurship, Business, and Economic Issues 27 (1), 59–70.

⁵ Mody, A., Ohnsorge, F. and D. Sandri (2012), Precautionary Savings in the Great Recession, IMF Working Paper No. WP/12/42.

⁶ Kilian, L. (2014), Oil Price Shocks: Causes and Consequences, CEPR Discussion Paper No. DP9823.

- ⁷ Edelstein, P. and L. Kilian (2009), How sensitive are consumer expenditures to retail energy prices?, *Journal of Monetary Economics* 56 (6), 766–779; Baugh, B., I. Ben-David und H. Park (2014), Disentangling Financial Constraints, Precautionary Savings, and Myopia: Household Behavior Surrounding Federal Tax Returns NBER Working Paper Nr. 19783.
- ⁸ Aizenman, J., Cavallo, E. and I. Noy (2015), Precautionary strategies and household savings, SEF Working paper: 07/2015.
- ⁹ Edelstein and Kilian (2007), Retail Energy Prices and Consumer Expenditures, Z. B. Barsky, R. und L. Kilian (2004), Oil and the Macroeconomy since the 1970s, NBER Working Paper No. 10855. Jones et al. (2003), siehe auch Literaturüberblick in Shuddhasawtta, R., Salim, R. and H. Bloch (2010), Impact of crude oil price volatility on economic activities: An empirical investigation in the Thai economy, *Resources Policy* 121–132; Tang, W., Wu. L. and Z. Zhang (2010), Oil price shocks and their short- and long-term effects on the Chinese economy, *Energy Economics* 32: S3–S14; Rasmussen, T. N. und A. Roitman (2011), Oil Shocks in a Global Perspective: Are they Really that Bad? IMF Working Paper WP/11/194.
- ¹⁰ Edelstein, P. and L. Kilian (2009), How sensitive are consumer expenditures to retail energy prices?, *Journal of Monetary Economics* 56 (6), 766–779.
- ¹¹ Weltbank (2015), Understanding the Plunge in Oil Prices: Sources and Implications, *Global Economic Prospects 2015*, 155–168.
- ¹² <http://www.wec-indicators.enerdata.eu/industry-energy-intensity-world-level-trends.html>, Viewed: 30.03.2015.
- ¹³ Kilian, L. (2014), Oil Price Shocks: Causes and Consequences, CEPR Discussion Paper No. DP9823.
- ¹⁴ Kilian, L. (2014), Oil Price Shocks: Causes and Consequences, CEPR Discussion Paper No. DP9823; Rotemberg, J.J. und M. Woodford (1996), Imperfect Competition and the Effects of Energy Price Increases on Economic Activity, *Journal of Money, Credit and Banking* 28 (4, 1): 549–577.
- ¹⁵ Last available value respectively, source: IMF.
- ¹⁶ After tax, for the year 2011, Source: IMF (2013); Energy Subsidy Reform: Lessons and Implications.
- ¹⁷ Weltbank distinction.
- ¹⁸ Blanchard, O. J. and J. Galí. (2008), The Macroeconomic Effects of Oil Price Shocks: Why are the 2000s so different from the 1970s? NBER Working Paper Nr. 13368.
- ¹⁹ Hunt, B., Isard, P. and D. Laxton (2001), The Macroeconomic Effects of Higher Oil Prices, IMF Working Paper Nr. 01/14.
- ²⁰ Jones, D. W., Leiby, P. N. and I. K. Paik (2004), Oil Price Shocks and the Macroeconomy: What Has Been Learned Since 1996, *Energy Journal* 25 (2), 1–32.