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OIL PRICES AND THE SWISS ECONOMY(*)

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I. INTRODUCTION

The relationship between oil prices and economic activity received much attention since the 1973-1974 oil crisis. The empirical observation that oil price increases preceded most of the recessions in the US also added impetus to the research in the field. Most research, however, focused on the effects of higher oil prices on the US economy. It is the aim of this paper to provide a fresh look at the case of a small open industrial economy without oil resources, such as Switzerland, facing oil price shocks. In doing so, we first review the theoretical issues regarding the macroeconomic effects of oil price shocks in Part II of this paper. In part III, we examine the existence (or lack thereof) of Granger-causal relationships between two measures of oil price changes and Swiss macroeconomic variables. Part IV of this paper uses the KOF's (Swiss Institute for Business Cycle Research) macroeconometric model for Switzerland to simulate and track the effects of an oil price shock on the Swiss economy. Part V concludes.

II. THEORETICAL ISSUES

A. Transmission mechanisms and the role of monetary policy

In the literature on the macroeconomic effects of oil price increases, the following four main channels of transmission of oil shocks into an economy were considered: 1) supply-side shock effects, 2) income transfers approach, 3) real balance effects, and the 4) behaviour of the monetary authority.

In what follows, we try to present an integrated, not mutually exclusive, framework for analysing the effects of higher oil prices. (See Brown & Yücel (2002) for a further survey of the literature.) There are, of course, many "ifs" in the analysis, but they are not necessarily unrealistic.

The supply-side shocks approach makes use of a production function where oil is considered as a factor of production. When oil prices rise, firms in the economy respond by using less of it. Thus, *ceteris paribus*, output declines. Given the same level of capital and labour, it indeed appears as if there is a decline in productivity - a fact generally observed after oil price shocks.

In a textbook framework, e.g. Abel and Bernanke (2001), the increase in the oil price leads to an increase in the general price level, and for a given level of money supply, it reduces the real money supply. The short-term result is an increase in the real interest rate. Whether the consumers perceive the oil price shock as temporary or permanent also plays a role. If the shock is perceived to be temporary, i.e., short-term effects larger than the long-run effects, consumers may attempt to smooth their consumption by borrowing more (or saving less), which again pushes the equilibrium real interest rate upwards. The monetary authority could counteract this by increasing the money supply, but it is unlikely to do so if the shock is only temporary. The behaviour of the monetary authority is also a crucial point under the real balance effects approach, as suggested by Pierce & Enzler (1974). If the monetary authority does not follow an accommodative policy, then interest rates move up and hinder economic growth. On the other hand, the actual increase in the real interest may turn out to be less than originally thought. This can result under the income transfers approach. According to Fried & Schulze (1975) and Dohner (1981), the decline in the purchasing power in oil-importing

countries more than offsets the increase in the incomes and purchasing power in oil-exporting countries. As a result, world demand for goods declines, leading to an increase in savings. This puts downward pressure on the real interest rate and counteracts the above described upward pressure.

For a small open economy, there may also be additional channels of transmission. The main effects should come from the reduced purchasing power in their export markets (as in the income transfers approach) and possibly from increased uncertainty in the investment environment. A war, such as the Gulf war of 1991 or the War on Iraq at the beginning of 2003, may be the cause of the oil price shock, leading to a decline in consumer confidence and clouding the investment environment. Thus, the background reason for an oil price shock may also lead to a demand-side shock. Nevertheless, imports will also shrink both in reaction to the reduction in GDP and due to the increase in import prices. Therefore, the size of the net effect on GDP will depend on the respective price and income elasticities, and that is an empirical matter to be resolved.

Overall, higher oil prices could lead to a macroeconomic setting with lower GDP growth, higher real interest rates, and higher inflation – consistent with the stagflation scenario as experienced in the 1970s. Furthermore, the size of the decline in GDP and the accompanying increase in unemployment may be higher if there are rigidities in nominal and/or real wages – unless nominal GDP remains unchanged through either an increase in 'unexpected' inflation or by monetary policy action.

The last point draws one's attention to the behaviour of the monetary authority in the face of oil price shocks. Accommodative policy aimed at keeping the nominal GDP unchanged, for example, may partially counteract the decline in real GDP at the cost of having higher inflation. On the other hand, an accommodative monetary policy reaction may, indeed, not be desirable under inflation targeting. If the increase in oil prices is large enough to push the target inflation rate out of the upper bound, then a restrictive monetary policy may rather be the choice - deepening the real adverse effects of the oil shock.

In any case, the monetary authority would have to overcome various problems in conducting its policies in an environment of oil price shocks. First, the velocity of money changes (increases) in response to higher real interest rates. Second, there may be some degree of money illusion among economic agents. Third, allowances have to made for market imperfections. Last but not least, a choice on which definition of inflation should be used has to be made. That is, should the CPI as it is, or some 'core' measure of inflation be taken as an indicator of the true inflationary pressures in the economy? It may be argued and there is more recent evidence that an oil price shock influences mainly the CPI by its share in it and does not spill much into the 'core inflation'. Nevertheless, as demonstrated by Hunt, Isard and Laxton (2001), the consequences of incorrectly assuming that oil prices have 'no core effects' can be costly. In sum, monetary policy might have a role in how an oil price shock affects the economy. But, oil price shocks also increase the potential for errors in monetary policy.

B. Is the link between oil prices and economic activity asymmetric and/or weakening?

There are two issues at hand. The first one, as investigated by Hamilton (1983), is that oil price increases precede most recessions, but the other side of the coin does not seem to hold. That is, large decreases in oil prices are generally not followed by booms in economic activity. This observation brings into one's mind the question of whether the effects of oil

price changes on the economy are asymmetric. Tatom (1988), Mork (1989, 1994), and Hamilton (1996) discuss this possible asymmetry and provide some evidence for it.

In account of the fact that the above considered supply-side shock scenario and its immediate extensions cannot account for a possible asymmetry, various attempts were made to provide a plausible explanation. Hamilton (1988), for example, argued that decreases and increases in oil prices affect the economy in a similar way, but adjusting to changing prices is costly: the net effect being about zero in the former case and negative in the latter. Other explanations for the asymmetry are the adverse effects of uncertainty on the investment environment (Federer, 1996), an embedded energy-output ratio in the capital stock (Atkeson and Kehoe, 1999), co-ordination problems between firms, asymmetric response of refined petroleum products' prices (especially gasoline) to changing crude oil prices (Bacon (1991) and Huntington (1998)), or again the role of monetary policy.

The source of the asymmetry is not well-understood, and it may be different in different institutional settings. This is, however, an important consideration for the overall analysis of the relationship between oil prices and economic performance.

The second issue at hand is again an empirical one. It is observed that oil price shocks of the late 1990s and early 2000s had less measured effects on the economy than those of the 1970s and early 1980s. In addition, only a weak pass-through from oil prices to core inflation is found (e.g., Hunt, Isard and Laxton (2001). In general, a number of facts, such as a decline in the energy consumption to GDP ratio and the existence of a strong economic expansion in the late 1990s, also support a weaker relationship between oil price increases and economic performance.

Nevertheless, an understanding of how an oil price shock (positive or negative) affects macroeconomic performance and why the economy has become less sensitive to oil price shocks remains important for optimal policy making.

III. OIL PRICES AND THE SWISS ECONOMY: A Causal Investigation

A. Methodology

In this section, we carry out an empirical investigation of the effects of oil price changes on the Swiss economy. In doing so, we confine ourselves to the framework of Granger-causality tests. According to Granger (1969), if the inclusion of past (lagged) values of X still significantly contributes to the explanation of Y in a regression of Y on its own past values and all other relevant information, then X is said to 'cause' Y. In what follows, we use the bivariate version of Granger's causality test, where X is a variable representing oil price changes and Y is a macroeconomic variable, such as real GDP.

The aim is to find out whether oil price changes 'cause' or explain significantly (in Granger's sense) other macroeconomic variables in Switzerland. The bivariate framework may sound restrictive at first, but we justify it by making use of the theorem that for a variable X to be a 'direct cause' of another variable Y, X must cause Y in all settings: bi- and multivariate. Therefore, the finding of 'X causes Y' in a bivariate setting is a necessary condition for X to be a direct cause of Y.

There exist, however, a number of methodological problems in testing for Granger-causality. The main problem is how to choose the (optimal) number of lags for X and Y in the regression. We address this problem by following Hsiao's (1979,1982) approach and using a statistical model selection criterion, namely Schwarz's (1978) 'Bayesian Information Criterion (BIC)'. The BIC concerns itself less with whether a true model exits or not, and rather searches for the most probable model. The formula is: $BIC = (ESS/T)*T^{(k/T)}$, where ESS is the error sum of squares from estimation of the model in question, T is the sample size, and k is the number of estimated parameters in the model. Our choice is also based on Mills and Prasad's (1992) comparison of the performance of various statistical model selection criteria by means of Monte-Carlo studies (that is, when the true model is known). They suggest (pp. 221-222) that the BIC criterion "... should probably be the first choice of applied researchers."

In addition, we follow Penm and Terrell (1984) and Kang (1989) to extend the use of BIC to specify subset autoregressions and subset transfer functions. The 'subset' approach allows for the suppression of insignificant lags between lag 1 and the maximum lag M, where M is chosen *a priori* (M>1), and leads to more efficient estimates.

B. Data Description

In view of the discussion on the possible asymmetric effects of oil price changes, we use two different measures of oil price shocks. The first one is the conventional quarter-over-quarter change in real oil prices and represents the case for symmetric effects from oil price shocks. Figure 1 shows the level of the real crude oil price (Brent) at 1990 OECD prices . This variable is referred to as POIL90 in the rest of this paper.

< Figure 1 >

The second oil shock measure is Hamilton's (1996) 'net oil price' series, representing the case for only large positive oil price shocks. In Hamilton's definition, if the current oil price is above the maximum of the oil price in the preceding 12 months, this represents a positive oil price shock. This measure can capture asymmetric response of the economy to oil price shocks that can arise because of adjustment costs. Figure 2 shows the percentage changes in Hamilton's net oil prices using quarterly data. It should be noted that the size of the shock in 1974 was re-scaled by one-third to make the Figure 2 easier on the eye. We call this variable HNOPP in the following discussion.

< Figure 2 >

The Swiss macroeconomic data used in the analysis were taken from KOF's databases. In our empirical investigations, we cover the period from 1980 to 2002 (second quarter) using quarterly data. Given the evidence in the literature on a weakening link between oil prices and economic performance, we chose to constrain our attention to a rather recent period that does not include the oil price shocks of mid- and late-1970s for the purposes of this study. A comparison of whether oil prices had significantly different effects on the Swiss economy in

the past is left as a topic for future research. The list of macroeconomic variables included in the analysis and their shortcuts are given in the Appendix.

C. Empirical Results

In order to test for Granger-causality from oil price changes and the variables listed in the Appendix, we first tested whether the POIL90 and HNOPP variables are stationary or not. This was done by using the augmented Dickey-Fuller and Phillips & Perron tests. Both variables were found to be stationary, and quarter-over-quarter growth rates of the macroeconomic variables (which are non-stationary in levels) were used in the rest of the analysis.

The empirical methodology of the subset-transfer-function-based Granger-causality tests was implemented as follows. First, we fitted the best univariate autoregressive specification for each macro variable by using the BIC. The resulting BIC values thus obtained represented the best case for non-causality. Second, we introduced the lagged values of the oil price variables on the best specifications for the macro variables. The maximum lag-length allowed both in the (first-stage) univariate specifications and in the (second-stage) transfer functions was eight quarters. That is, we constrained ourselves rather to the short-term, but still allowed for enough passage of time for some dynamics to take place. If the best specification from the subset transfer function produces a lower BIC value than the respective univariate specification, this leads to the conclusion that the oil price variable 'Granger-causes' the macro variable in question.

Table 1. shows the results for the macroeconomic variables where the hypothesis of no Granger-causality from oil price shocks could be rejected.

< TABLE 1 >

An examination of the results presented in Table 1 leads to interesting observations. First, we find that there is some evidence of Granger-causality from oil price shocks to 21 of the 48 macroeconomic variables we examined. In addition, when the findings are taken together, there seems to be some real macroeconomic effects arising from oil price shocks. However, when we look at the effects of POIL90 (i.e., shocks have symmetric effects) and HNOPP (i.e., only when large positive oil price increases are considered) individually, we see that it is rather the asymmetric effects that 'Granger-cause' real macroeconomic variables. Foreign trade sector also appears to be largely affected by HNOPP, which is in line with the small open economy framework.

We also see that two variables, namely the CPI and CPICORE, do not appear in Table 1. For these variables, we found that the effects of oil price changes are only limited to contemporaneous effects. This indicates that oil price shocks do not spill into the core measures of CPI in Switzerland to any significant degree. If oil price shocks have 'core inflation effects', relative prices in the economy change, which could affect resource allocation decisions and lead to more significant real effects.

When we track the effects of oil price changes in view of what they Granger-cause, we can depict the following picture: an oil price hike increases energy and import prices. This puts

upward pressure on the general price level, and drives short- and long-term interest rates up (for a given level of money supply). The increase in the price level also leads to increases in wages and salaries (wages indeed increase less than the increase in prices). As a result of higher interest rates and uncertainties in the investment environment, fixed capital investments decline, adversely affecting the economy's potential output as well. Exports are also negatively affected due to the lower growth and purchasing power in the export markets. So far, these effects combine to create a decline in GDP. However, with built-in stabilisers in effect, the economy responds to this environment with lower import demand. A decline in imports of goods results due to lower domestic product and an increase in import prices. The Swiss also appear to curb their international tourism demand, perhaps, due to lower incomes, higher cost of travel, and other uncertainties. Exports to non-industrial countries and the stock market reaction might create further smoothing effects on GDP. In the former case, Swiss exports to oil exporting countries may be increasing, while the latter case may result due to petro-dollar investments. Nevertheless, these two effects appear to hold only in the short-term.

Overall, the net effect on GDP is not so clear, although it should be mildly negative. Table 1 shows this as a confirmed negative effect from (asymmetric) oil price shocks to domestic demand, but a question mark arises when it comes to the effect on GDP. We have placed that question mark because the detection of Granger-causality strictly in line with our methodology was not possible. However, the BIC figures from the "oil price changes Granger-cause GDP" hypothesis were very close to the best BIC value representing the case for non-causality. By using conventional statistical significance tests, however, we find that the negative effects from oil price shocks to GDP are significant at 5 per cent level. Remaining variables, with lower employment and a decline in inventory investments, are also in line with a decrease in GDP.

IV. ANALYSING THE EFFECTS OF OIL PRICE SHOCKS WITH KOF'S MACRO MODEL FOR SWITZERLAND

In the previous section, the bi-variate Granger-causality tests provided an overall, but rather qualitative, picture of how oil shocks affect Switzerland. Despite their value for analytical purposes, a multivariate framework is needed to take interactions into account and to make quantitative estimates for the effects of oil price shocks.

To this effect, we have used KOF's macroeconometric model for Switzerland to simulate a large oil price shock and to obtain quantitative estimates of its effects on the Swiss economy. KOF's econometric model for Switzerland is a medium-scale disequilibrium macro model, which is also being regularly used to make forecasts for the Swiss economy. The simulation period runs from the beginning of 2003 to the end of 2004 using quarterly data.

In running our simulations, we first need to choose the type of oil price shock. While different scenarios are possible, we have opted for a shock with a large increase (45%) in the first quarter of 2003 and a gradual decrease afterwards. This is inline with but not limited to the hike in the oil prices especially in the first quarter of 2003 due to the War on Iraq. In our scenario case, we assume that oil prices still remain 20% above the base scenario at the end of 2004. Figure 3 shows the base and the alternative oil price shock scenarios (in current US dollars).

< Figure 3 >

Next, we sketched a corresponding international outlook scenario. In doing so, we were guided by the estimates of Hunt, Isard, and Laxton (2001), who used the IMF's MULTIMOD model to analyse the effects of different types of oil price shocks on the world economy. The type of oil price shock and the corresponding international outlook are certainly arguable, but they should still represent one plausible scenario.

Table 2 shows our international outlook scenario under the oil price shock shown in Figure 3.

< Table 2 >

The next step is the simulation of the model with the base and alternative oil price and international outlook scenarios for the period 2003-2004. Tables 3, 4, and 5 present the differences between the alternative and baseline scenarios for various model variables.

< Table 3 >

Table 3 illustrates the quantitative impact of the oil price shock on main national accounts. GDP decreases by about –0.1 percentage point in the first year, while the downward effect is larger in the second year (about -0.3 percentage points). Rather larger declines in private consumption expenditures and investments in the second year seem to be responsible for the decline in GDP. Exports decline generally marginally, and the decline in imports are not sufficient to counterbalance the other demand-side components.

< Table 4 >

The results presented in Table 4 suggest that the decline in real wages (-0.1 percentage points in both years) and the associated decline in real disposable incomes (-0.1 and –0.3 percentage points in the first and the second years, respectively) could explain the decline in private consumption. Labour productivity also shows a decline - albeit slightly-, which is also consistent with international evidence. Saving rate, on the other hand, shows an increase in both years as a result of lower employment and higher interest rates that possibly combine to curb private consumption in an environment of increased uncertainty.

< Table 5 >

Table 5 shows the extent of pass-through from the oil price shock to prices, interest rates, and exchange rates. The private consumption deflator, which corresponds to CPI in general, shows a 0.4 percentage point increase in the first year, which is reduced to 0.2 percentage points in the second year. The increase in short-term and long-term interest rates are 0.6 and 0.5 percent in the first year, respectively. Thus, there is some increase in the real rates, which may depress investments and put further downward pressure on private consumption. We also observe that the short-rates increase more than the long-rates when the shock hits the economy in the first year. This may suggest a slightly tighter monetary policy reaction. This is, however, reversed in the second year. In addition, given the current inflation forecasts for 2003 (KOF's Spring 2003 forecasts point to only a 0.7 per cent increase in the private consumption deflator), an additional 0.4 percentage point increase would still not push the inflation above the Swiss National Bank's (SNB) 2 per cent upper limit for price stability. Note that nominal GDP is unchanged in the first year, and -0.2 percentage points lower in the second year than the baseline scenario. This may leave some room for expansionary monetary policy in the second year to lessen the output effects (at least to a degree to keep nominal

GDP unchanged) since price stability would not be in danger. Indeed, in view of the oil price shock and the current stagnation in the Swiss economy, the SNB already lowered its key interest rate. Thus, the SNB acted to accommodate the oil price shock given that maintaining its inflation stability target would not be jeopardised.

External trade sector is where the effects of oil price increases are most felt. The increase in export and import prices are 0.8 and 2.4 percentage points, respectively, in the first year. In the second year, however, the base effect and a relative decline in the oil prices push these prices down. The same is also true for the price index for machinery and equipment. The exchange rate is a function of the relative changes in real GDP growth, price levels, and interest rates, and the CHF/EUR rate does not show significant changes under our overall international and Swiss scenarios.

V. CONCLUSIONS

In this paper, we have analysed how an oil price shock might affect an economy in general and the Swiss economy in particular. According to our estimates, large increases in oil prices lead to a decline in Swiss GDP. There is also some evidence of an asymmetric relationship between oil price shocks and economic performance in Switzerland, i.e., positive oil price shocks have real effects while decreases in oil prices do not lead to a boost. We have also found that oil price increases do not affect 'core inflation' to any significant degree. Furthermore, the adverse effects of a large oil price shock may be felt with a time lag due to differences in sectoral responses, or because investments and consumer spending are sensitive to an uncertain environment. Oil price shocks may affect a small open industrial economy without oil resources through their adverse effects on the country's export markets. We find this true for Switzerland, but imports also shrink and lessen the overall impact on real GDP growth.

In our analyses, we first used bi-variate Granger-causality tests to investigate the relationship between oil price shocks and Swiss macroeconomic performance. Then, we employed KOF's macroeconometric model to simulate and track the effects of an oil price shock through the Swiss economy. In evaluating the results obtained from the two approaches, what is remarkable is the similarity between the conclusions reached from a rather simple bi-variate causality testing approach and a full-fledged macro model simulation.

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APPENDIX: THE VARIABLES INCLUDED IN THE EMPRICAL ANALYSIS

Real Macroeconomic Variables

Real GDP (GDP)
Capacity Output (YCAP)

Private consumption (CONSP)
Government consumption (CONSG)

Domestic demand (DOMDEM)
Domestic demand without inventories (DOMDEMOI)

Inventory investment (IINV)
Business investment (IBUS)
Total Construction sector investment (ICNSTR)
Construction Investment in housing (IHOUSE)
Construction investment in industry and business facilities (ICBUS)
Fixed Investments (IFIX)
Investments in machinery and equipment (IME)

Total exports (EXTOT)
Total goods exports (EXG)
Goods exports to non-industrial countries (EXGNI)
Exports of services (EXS)
Tourism exports (EXT)

Total imports (IMTOT)
Total goods imports (IMG)
Imports of services (IMS)
Tourism imports (IMT)

Price Variables

GDP Deflator (PGDP)

Private Consumption Deflator (PCONSP)
Consumer price index (CPI)
Core consumer price index (CPICORE)
Factor prices without housing rents and government sector (PFOHG)
Energy prices (PENERGY)

Price index for total exports (PEXTOT)
Price index for total goods exports (PEXG)
Price index for exports of services (PEXS)
Price index for tourism exports (PEXT)

Price index for total imports (PIMTOT)
Price index for total imports without energy (PIMCOE)
Price index for imports of services (PIMS)
Price index for tourism imports (PIMT)
Price index for machinery and equipment (PIME)
Price index for construction investments (PICNSTR)

Labour Market Variables

Total full-time equivalent employment (LTOTV)
Unemployment (UNEMP)
Total wage income (WAGE)
Wage income excluding self-employment (WINC)
Labour productivity(LPROD)

Monetary and financial sector variables

Short-term interest rates (SRATE)
Long-term interest rate (LRATE)
Swiss Franc / Euro exchange rate (WKFREURO)
Swiss Franc / US dollar exchange rate (WKFRDO)
Stock market index (STOCKS

TABLE 1.

MACRO VARIABLES FOR WHICH THE HYPOTHESIS OF NO GRANGER-CAUSALITY FROM OIL PRICE SHOCKS COULD BE REJECTED

		Symmetric Effects		Asymmetric Effects	
Variable	**Best univariate BIC (lags)**	**BIC with POIL90 (lags)**	**Sign**	**BIC with HNOPP (lags)**	**Sign**
EXGNI	-3.484029 (4,8)	-3.530485 (2)	+	-3.498371 (2)	+
D(LRATE)	0.414796 (1,5)	0.359018 (5,7)	+		
D(SRATE)	2.079443 (1)	2.057957 (7)	+		
STOCKS	-2.276406 (6)	-2.287053 (2)	+		
WAGE	-9.988194 (1,3,5,6)	-10.04757 (1,2,4)	+		
WINC	-9.891589 (1,3,5,6)	-9.955303 (1)	+		
PENERGY	-1.775231 (1,3,4)	-1.999354 (1,8)	+		
YCAP	-7.122847 (1)	-7.148859 (8)	-		
IFIX	-4.198860 (3)	-4.272864 (1,6)	-	-4.209763 (6)	-
LTOTV	-7.719786 (1,2,4,8)	-7.781898 (8)	-	-7.731917 (8)	-
PEXS	-8.227755 (1,4)			-8.238322 (6)	+
PIMTOT	-5.171918 (8)			-5.175644 (1)	+
DOMDEM	-6.619425 (3)			-6.658299 (2,7)	-
EXG	-4.413682 (1)			-4.483640 (8)	-
EXS	-2.884430 (1,3)			-2.918911 (6)	-
EXTOT	-4.865169 (1)			-4.891622 (8)	-
IMG	-4.516723 (3,8)			-4.551806 (4)	-
IMT	-7.269251 (1,4,5)			-7.279181 (5)	-
IINV	16.09684 (1,2)			16.027440 (2)	-
GDP	-7.314997 (1,8)	-7.313243 (8)	- (?)	-7.307874 (7)	- (?)

(1) Quarter-over-quarter growth rates of all variables except LRATE and SRATE are used in the analysis. For LRATE and SRATE, where D(.) denotes the first difference, absolute quarter-over-quarter changes are used.

(2) The best univariate BIC stands for the value of Schwarz's (1978) Bayesian Information criterion obtained under the lag specification given in the paranthesis. As an example, the values of (1,4) for PEXS indicate that the best univariate specification for PEXS was dlog(PEXS) = constant + b_1*dlog(PEXS(-1)) + b_2*dlog(PEXS(-4)) with a BIC value of -8.227755.

(3) The BIC values reported for the specifications with oil price variables (POIL90 and HNOPP) can be similarly interpreted. For the case of PEXS, the inclusion of HNOPP into the above specification with lag 6 produces a lower BIC value (-8.238322) than the

(4) univariate specification, leading us to the conclusion that HNOPP Granger-causes PEXS.

Illustration of the Model Selection Procedure

dlog(IFIX)

Lag	**Log(BIC)**
1	-4.150824
1-2	-4.108250
1-3	-4.105733
1-4	-4.051512
1-5	-4.015691
1-6	-3.963320
1-7	-3.912197
1-8	-3.896217

dlog(IFIX)

Lag	**Log(BIC)**
1	-4.150824
2	-4.144624
3	-4.198860
4	-4.137662
5	-4.142423
6	-4.136449
7	-4.141070
8	-4.147888
Subsets	
1,3	-4.153758
1,8	-4.109970
1,3,8	-4.116025
3,8	-4.159782

Alternative World Scenario

(Change from the baseline in percentage points)

	2003	**2004**
Real GDP Growth in:		
USA	-0.25	-0.23
EU	-0.14	-0.10
Japan	-0.05	-0.00
Consumption in the OECD area	-0.36	-0.26
OECD Price Index	+1.25	+0.61
Consumer Price index in Germany	+1.13	+0.51
EUR/USD Exchange Rate (level)	+0.006	+0.008
Short-term interest rates in Germany (level)	+0.7	+0.53
Long-term interest rates in Germany (level)	+0.6	+0.50
Average Crude Oil Price (Brent)	$35.5	$29.1

TABLE 3. Real Macro Variables

(Change from the baseline in percentage points)

	2003	**2004**
Real GDP	-0.07	-0.29
(Nominal GDP)	-0.02	-0.18
Private Consumption	-0.11	-0.45
Investments (Industrial Buildings & Facilities)	-0.07	-0.66
Investments (Machinery & Equipment)	-0.42	-1.66
Exports (Total)	-0.08	-0.07
Goods	-0.06	-0.01
Tourism	-0.19	-0.67
Services	-0.11	-0.11
Imports (Total)	-0.17	-0.86
Goods	-0.19	-0.92
Tourism	+0.04	-0.18
Services	-0.12	-0.69

TABLE 4. Prices and Monetary Variables

(Change from the baseline in percentage points)

	2003	**2004**
A. Prices (Change from the baseline in percentage points)		
GDP Deflator	+0.05	+0.11
Private Consumption Deflator	+0.40	+0.17
Investments (Construction)	+0.02	+0.03
Investments (Machinery & Equipment)	+0.50	-0.03
Exports (Total)	+0.82	-0.11
Goods	+0.93	-0.17
Tourism	+1.11	+0.17
Services	+0.07	+0.13
Imports (Total)	+2.36	-0.55
Goods	+2.54	-0.65
Tourism	+1.16	-0.09
Services	+0.45	+0.62
B. **Monetary Variables** (deviation from the baseline)		
Short-term interest rates	+0.59	+0.41
Long-term interest rates	+0.49	+0.48
Exchange Rate (CHF/EUR)	+0.005	-0.005

Table 5. Labour Market and Incomes

(Change from the baseline in percentage points)

	2003	**2004**
Employment (Full-time Equivalent)	-0.02	-0.18
Wage Income (BFS, Nominal)	+0.03	+0.04
Wage Income (excl. Self-employment)	+0.03	+0.07
Real Wages Income (excl. Self-employment)	-0.10	-0.11
Labour Productivity	-0.05	-0.11
Real Disposable Income	-0.08	-0.29
Saving Rate	+0.03	+0.18

Figure 1. Real Oil Price (US$)
(at 1990 OECD Prices)

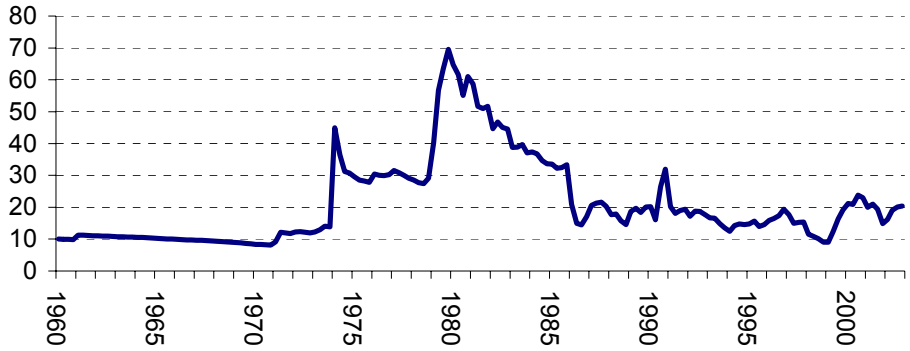

Figure 2. Hamilton's Net Oil Price
(% Change)

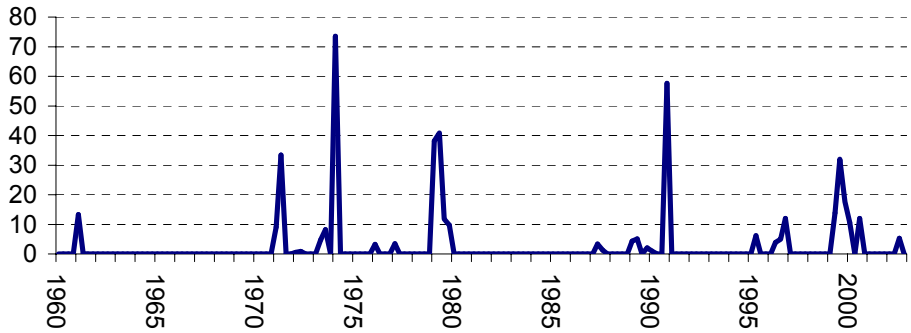

Figure 3. Oil Price Scenario
(in current US$)