The Macroeconomic Impacts Associated with Realising Energy Efficiency Improvements in the G20 Countries

A report for UNEP RISOE Centre, Technical University of Denmark

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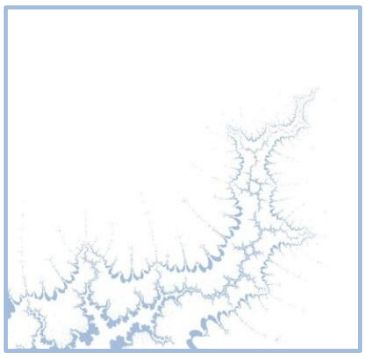

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Authorisation and Version History

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3.0	04/11/14	Hector Pollitt	Third version with results for 2030
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1.0	08/09/14	Hector Pollitt	First draft

Contents

1 Introduction

1.1 Introduction to the project

This document summarises the key findings from estimating the macroeconomic impacts associated with realising energy efficiency improvements in the G20 countries. The analysis has been carried out by Cambridge Econometrics (CE) in cooperation with ECN and Enerdata. The assessment makes use of a combined modelling approach, taking results from two technological engineering energy system models (TIAM-ECN and POLES) and using them as inputs to a macroeconomic model (E3ME) to estimate the macroeconomic impacts of energy efficiency. This report summarises CE's contribution to the study using the E3ME model.

The next section briefly summarises the E3ME model. Chapter 2 provides a detailed description of the modelling approach and assumptions. Chapter 3 summarises expected impacts, Chapter 4 reports key headline results from the modelling and Chapter 5 concludes. A longer description of E3ME and its classifications is given in the appendices.

1.2 Introduction to E3ME

The E3ME model

E3ME is a global Energy-Environment-Economy (E3) model in which behavioural relationships are estimated empirically. The structure of E3ME is based on the system of national accounts, as defined by ESA95 (European Commission, 1996), with further linkages to physical material consumption, energy use and environmental emissions. The labour market is also covered in detail, with estimated sets of equations for labour demand, supply, wages and working hours. International trade is modelled bilaterally at sectoral level. In total there are 33 sets of econometrically estimated equations, also including the components of GDP (consumption, investment, and international trade), prices, energy and material demands. Each equation set is disaggregated by country and by sector.

E3ME classifications

E3ME's historical database covers the period 1970-2012 and the model projects forward annually to 2050. The main data sources are Eurostat, United Nations, OECD's Stan database, World Input-Output Database (WIOD) and the IEA, supplemented by national sources. Gaps in the data are estimated using customised software algorithms.

The main dimensions of the model are:

- 53 world regions[1], including explicit treatment of the G20 countries (except South Africa and Saudi Arabia), EU28 plus candidate countries (see appendix B for the full list)
- 69 economic sectors (43 for regions outside Europe), including disaggregation of the energy sectors
- 43 categories of household expenditure (28 for regions outside Europe)

[1] This was expanded to 59 in 2015, including South Africa and Saudi Arabia.

- 22 energy users
- 12 different fuel types
- 7 types of materials
- 15 material users
- 14 types of air-borne emissions (where data are available) including the six greenhouse gases monitored under the Kyoto protocol

For more information on the E3ME model please see www.e3me.com.

2 Methodology

2.1 Modelling energy efficiency with E3ME

The E3ME model has been used extensively to provide estimates of the economic and employment impacts of energy efficiency programmes in Europe. It has recently been applied for similar analysis for regions outside Europe.

Key characteristics of the approach

E3ME has the following key distinctions that are considered to be appropriate for assessing the impacts of energy efficiency policies:

- Its non-equilibrium approach allows for the possibility that zero or negative-cost efficiency options can exist, and that they can draw on available labour and capital to boost overall production levels.
- The full integration of the economic national accounts, the energy system and emissions in E3ME allows for analysis of energy and climate policies in parallel, as well as taking into account rebound effects.
- Its modular approach allows for the incorporation of detailed inputs from external sources.
- The annual time profile of the model allows for an evaluation of the impacts in both the short and long runs, and the development of a profile over time.

E3ME baseline

The E3ME model baseline matches the 2013 *World Energy Outlook* (current policies scenario) and includes announced policies up to 2012. However, for this study the model baseline has been set up to match the business-as-usual cases in TIAM-ECN and POLES.

E3ME output

The E3ME results cover a range of indicators. For this project the main macroeconomic indicators are reported, including: GDP and sectoral economic output; employment; income; household expenditures; trade and investment. Rebound effects to energy demand are also reported in this report.

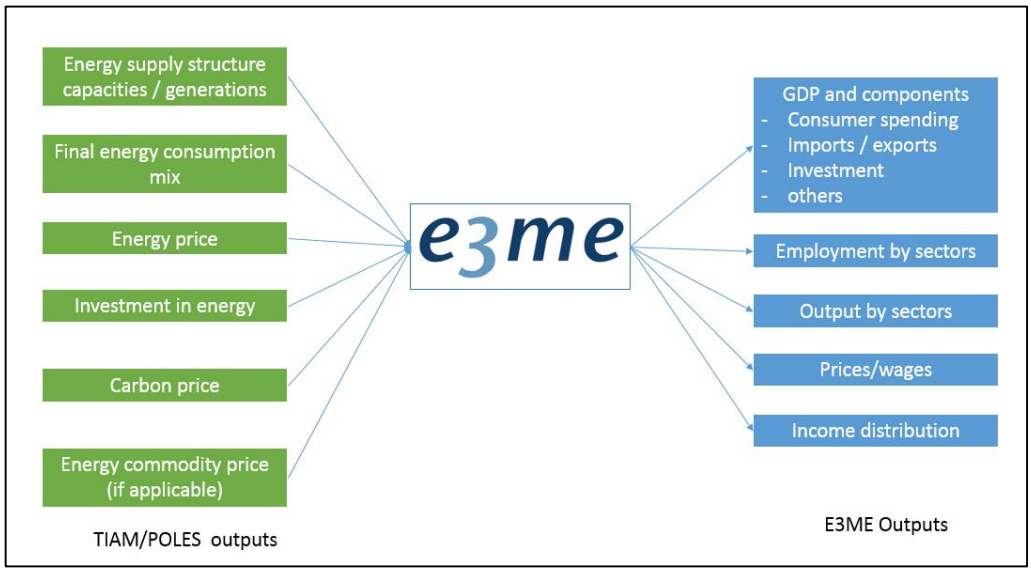
2.2 Linking E3ME to bottom-up engineering models

The E3ME model contains its own equation sets for estimating physical energy demand. The approach is top-down and econometric in nature, with energy demand (disaggregated by carrier and energy user) determined by economic activity, relative prices and investment/R&D. This approach is suitable for policies where there are price changes (such as energy or carbon taxes) but less suitable for investigating energy efficiency, where new technologies are developed (or taken up) as a result of policy. It is important to approach the modelling of energy efficiency savings from a bottom-up energy system perspective (see IEA, 2014, for a discussion). E3ME's structure enables such interactions with other models. For this study we have made use of the detailed energy results from the two highly regarded global bottom-up engineering models: TIAM-ECN and POLES.

The approach has the following advantages. First the strengths of the models are fully utilised: TIAM-ECN and POLES for their detailed energy systems modelling and E3ME for its detailed economic analysis. The results, where TIAM-ECN and POLES energy results are fed into E3ME to provide economic estimates, are therefore comprehensive. Second, all the models have a detailed regional coverage, enabling us to investigate the impacts of energy efficiency in most of the G20 countries. Third, both TIAM-ECN and POLES have previously been linked to E3ME successfully in the past.

Figure 2.1 summarises how outputs from the two energy systems models are translated to E3ME inputs to estimate the macroeconomic impacts of energy efficiency. These inputs are discussed separately in the next section.

Figure 2.1: E3ME linkages to bottom-up engineering models



For the regional coverages of the three models and how they are allocated please see Appendix B.

2.3 Limitations to the methodology

Several limitations are noted in our approach of modelling energy efficiency. This section highlights these limitations and provides recommendations for future methodological developments.

Linking an optimisation to a non-optimisation model

Both bottom-up energy technology models, TIAM-ECN and POLES, used in our analysis have cost-optimisation assumptions where the outcome of the scenarios represent an optimal outcome of a policy (the 'social planner' assumptions). The E3ME macroeconomic model in contrast is a simulation-based econometric model with no prior assumption on optimisation or economic equilibrium. This inconsistency in the energy and economic model properties does not represent a major disadvantage in our analysis since we

take a 'soft link' approach where outputs of the energy models are used as inputs to the economic model (as opposed to a full integration of the models).

As noted in Section 2.1, a comprehensive analysis of the macroeconomic impacts of energy efficiency requires a non-equilibrium economic approach which allows for zero or negative costs options.

Capacity and resource availability

In relation to the above points, as a non-optimisation model, it is also important to note that E3ME allows for the possibility of spare economic capacity to exist in each country modelled. For example, the baseline labour market projections include unemployed workers that could be moved into employment under the right economic conditions.

However, taking this example further, data restrictions mean that the model also assumes that, as long as there are people available to work, then they can take on new jobs regardless of the skills required. A further micro-based supplementary analysis is required to investigate this skill mismatch issue further.

The demand-led nature of the E3ME model also means that (outside the labour market) there is no explicit constraint on available capacity. It is therefore up to the model operator to ensure that the scenarios modelled do not exceed realistic boundaries.

Emerging sectors

The development of new technologies often results in new emerging niche sectors that do not fit well to existing NACE 2-digit economic sectors. The model results represent average outcomes of each sector but may conceal larger movements within the sectors, related to either new or existing technologies.

The Lucas Critique

One criticism that applies to E3ME and econometric models more generally is the Lucas Critique which suggests that past relationships may not be an appropriate guide for assessing changes under different policy conditions. In modelling terms, the critique suggests that the estimated regression coefficients should not be invariant but should change along with agents' response to a new policy. Although often overplayed, this is a valid criticism, particularly when assessing scenarios that move a long way from the base position. Nonetheless, our view is that the E3ME approach provides the best estimate of future responses to policies that cannot be verified.

2.4 Scenarios

This section describes the scenarios that were modelled, focusing on the way that the TIAM-ECN and POLES results were used as inputs to E3ME. Table 2.1 outlines the three policy scenarios.

Table 2.1: Scenarios summary

Scenario	Descriptions
BAU	A business as usual case
CT40	A global carbon price of $40/tCO2 ($2005) from 2020 to 2050
CT70	A global carbon price of $70/tCO2 ($2005) from 2020 to 2050
CT100	A global carbon price of $100/tCO2($2005) from 2020 to 2050

CO_2 prices

Carbon prices in the scenario are given in the scenario specification. These prices are used in TIAM-ECN and POLES to stimulate the energy efficiency investment. Carbon prices are not entered into the E3ME model as an additional carbon tax since this would mean double counting the costs. There are therefore no carbon prices in the economic modelling beyond those that are already in the baseline (e.g. EU ETS).

Power generation and electricity prices

For the purpose of this modelling exercise the power generation sector is treated as exogenous in E3ME. In both the E3ME baseline and policy scenarios, power generation results are set to match those from the TIAM-ECN and POLES models as these models have a much more detailed representation of the sector.

An important input to the scenarios is the amount of investment required to bring about the changes in the power sector. The additional investments are added exogenously to E3ME. It is assumed that the investments are financed by higher electricity prices, which are also taken from the TIAM-ECN and POLES results.

Employment in the electricity sector

Employment in the electricity sector is estimated outside the modelling framework and instead uses additional information on employment per MW of capacity for different power generation technologies (DG Energy, 2013).

Energy efficiency and investment

In E3ME, the energy efficiency savings are entered exogenously to the model and are set to match the TIAM-ECN and POLES results as closely as possible. The change in final energy demand from the two models is used as a guide for the level of energy efficiency savings in E3ME. These savings are then distributed among sectors and energy carriers.

The investments made by each sector are also entered exogenously to E3ME based on information available from TIAM-ECN and POLES. It is assumed in the scenarios that the energy efficiency investment that is undertaken is paid for by industry, resulting in higher costs (modelled in E3ME as an increase in unit costs). The model then estimates how much of these additional costs get passed on to final product prices based on estimated historical relationships.

Investments made by the household and services sectors are assumed to be funded by the government. We assume ‘revenue neutrality’ and the government must raise income tax accordingly to fund the expenditure. The scenarios are therefore revenue neutral, meaning that there are no direct changes in government balances. It should be noted that the revenue neutrality assumption still holds in the case where the required investment in the scenarios is less than in the baseline. In this case, government is assumed to use additional available revenues to reduce income tax rates.

Road transport investment

Two-thirds of road transport investment is assumed to be made in passenger cars and is modelled as adjustments in consumer spending patterns. The remaining third of road transport investment is assumed to be in large commercial vehicles and is paid for by the road transport industry.

Take up rates

In all cases, we assume that the amount of energy savings estimated in TIAM-ECN and POLES are fully taken up by end users of energy, i.e. the take-up rates in those models are used in E3ME. In reality, take up rates of energy efficiency programmes will vary and encouraging take up is a key issue for policy makers. For example, lack of access to credit or behavioural barriers can prevent users from taking up investment in energy efficiency, even in the case where it makes economic sense to do so.

Rebound effects

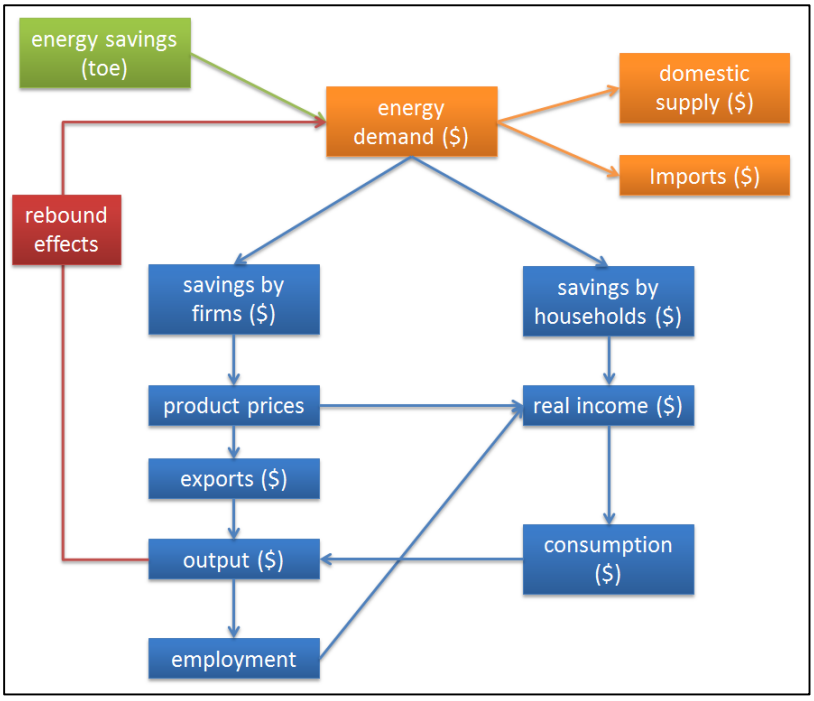
Rebound effects are an important issue to consider when looking at energy efficiency. For this modelling exercise we have introduced a one-way linkage between the POLES/ TIAM-ECN energy results and E3ME. This approach on its own cannot capture the rebound effects from energy savings. Nonetheless it is an issue that cannot be ignored and so we have carried out an additional model run in which rebound effects have been included, with the size of the rebound determined by the E3ME model's own equations.

3 Expected Macroeconomic Impacts

3.1 Expected impacts

Figures 3.1 and 3.2 provide conceptual frameworks for interpreting the main macroeconomic impacts of energy efficiency in E3ME. Energy savings reduce demand for energy which can be met either by reductions in energy imports or from the domestic supply of energy. These savings translate to cost savings to industries and households. Industry can improve its competitiveness if it chooses to pass on the cost savings to final product prices. Alternatively it can choose to retain cost savings to increase its profit margins. For households, savings on energy bills mean there is more disposable income to spend on other goods and services. The rebound effects in energy demand come through from higher economic activities as a result of the initial energy savings.

Figure 3.1: Macroeconomic impacts of energy savings



Investment in energy efficiency creates multiplier effects, through direct, indirect and induced effects in the economy (i.e. from supply chains). This leads to higher GDP and employment. However, when the costs of energy efficiency policies and investment are taken into account, the net impact on GDP will be smaller or may become negative. Depending on policy assumptions, the cost of policy can be paid through higher product prices, higher energy prices, or fiscal adjustments if governments are funding the measures directly. Higher product prices lead to real impacts through reductions in consumer spending and a worsening competitiveness of industries.

Figure 3.2: Macroeconomic impacts of energy efficiency investment

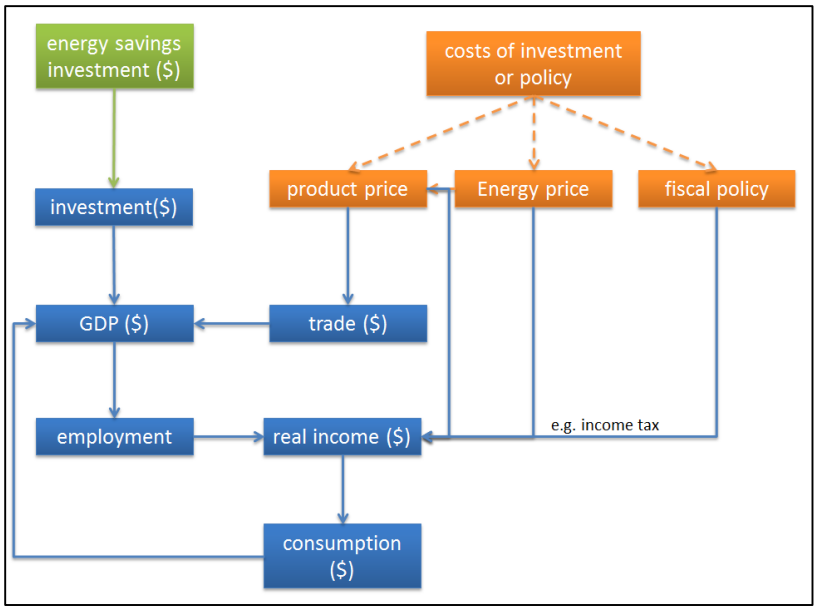


Table 3.1 provides a summary of expected impacts in the scenarios.

Table 3.1: Summary of expected impacts

Positive	Negative	Ambiguous
Energy Efficiency Investment made by electricity	Higher electricity prices	Trade between regions
Energy Efficiency Investment made by industry	Higher costs to industry	
Energy Efficiency Investment funded by government	Higher income taxes to balance budget	
Savings in energy costs input	Reduction in demand for energy sector output	
Reductions in energy imports	Reduction in energy exports	

4 E3ME Results

4.1 TIAM-ECN and POLES input comparison

Before we interpret the E3ME modelling results, it is important to understand the modelling inputs. Table 4.1 summarises the key E3ME inputs from TIAM-ECN and POLES.

Table 4.1: Comparison of TIAM-ECN and POLES inputs to E3ME

World additional electricity investment to the baseline ($2005bn)				
	2020	**2030**	**2040**	**2050**
TIAM-ECN_40	48.3	189.0	327.0	377.5
POLES_40	102.6	144.1	124.0	148.3
TIAM-ECN _70	130.3	382.3	594.6	775.9
POLES_70	131.6	207.1	140.4	162.5
TIAM-ECN _100	165.1	468.3	725.1	955.1
POLES_100	160.0	209.2	153.0	171.5
World additional non-electricity investment to the baseline ($2005bn)				
	2020	**2030**	**2040**	**2050**
TIAM-ECN _40	15.5	-25.6	18.8	133.8
POLES_40	23.4	165.4	423.8	572.3
TIAM-ECN _70	27.2	-46.3	19.4	138.2
POLES_70	33.8	274.6	710.9	921.8
TIAM-ECN _100	35.8	-6.0	170.6	216.2
POLES_100	43.3	386.1	987.5	1,237.6
World electricity price (% difference from baseline)				
	2020	**2030**	**2040**	**2050**
TIAM-ECN _40	14.5	35.9	34.2	26.8
POLES_40	7.0	14.9	15.0	14.0
TIAM-ECN _70	21.5	60.1	55.1	40.2
POLES_70	12.3	22.5	21.8	20.5
TIAM-ECN _100	28.3	75.2	65.4	50.6
POLES_100	17.2	28.7	27.3	26.0
Source(s): TIAM-ECN (ECN) and POLES (Enerdata).				

There are noticeable differences between the two models' results which will affect the economic outcomes from E3ME. The following differences are observed:

- The differences in investment levels are partly explained by how investment is defined in the models. In TIAM-ECN, investments are reported as annuities which include a technology-specific discount rate

while in POLES no foresight modelling is included. Therefore, POLES primary outputs provide economic indications on a yearly basis and not for a given time period.

- TIAM-ECN suggests higher additional investment in the electricity sector compared to non-electricity investment. POLES, in contrast, suggests lower electricity investment is required than non-electricity investment. Again this is partly due to how investment is calculated in the two models (see Box 1 below).
- Electricity prices increase by more in TIAM-ECN than in POLES, which partly reflects differences in electricity investment.
- The results for other energy prices (coal, oil and gas) are also available from TIAM-ECN and POLES. However, the two models have different definitions for other energy price variables. POLES reports these prices as final consumer prices (which includes carbon taxes) while TIAM-ECN presents them as raw commodity prices. As a result, the two set of energy price results are not comparable. E3ME requires a set of raw energy prices; however, since the results from TIAM-ECN suggest that the changes in the scenarios are relatively small we have decided to exclude these price variables in order to avoid biased economic outcomes.

Box 1: TIAM-ECN and POLES Investment Calculations

TIAM-ECN

a. Investment in the electricity sector
Investment costs describe capital in power plants and for intermittent renewable energy (RE) cost for grid connection / grid enhancement for integration of RE.

b. Investment in end-use sectors

Industry: the investment costs refer to the energy part of an industrial facility and do not reflect all investment of the industry sector.

Transport: cars investment refers to the whole car, for other transport technologies investment refers to the energy part only.

Residential and commercial: investment refers to energy conversion technologies.

Agriculture: investment reflects costs associated with energy conversion and GHG mitigation.

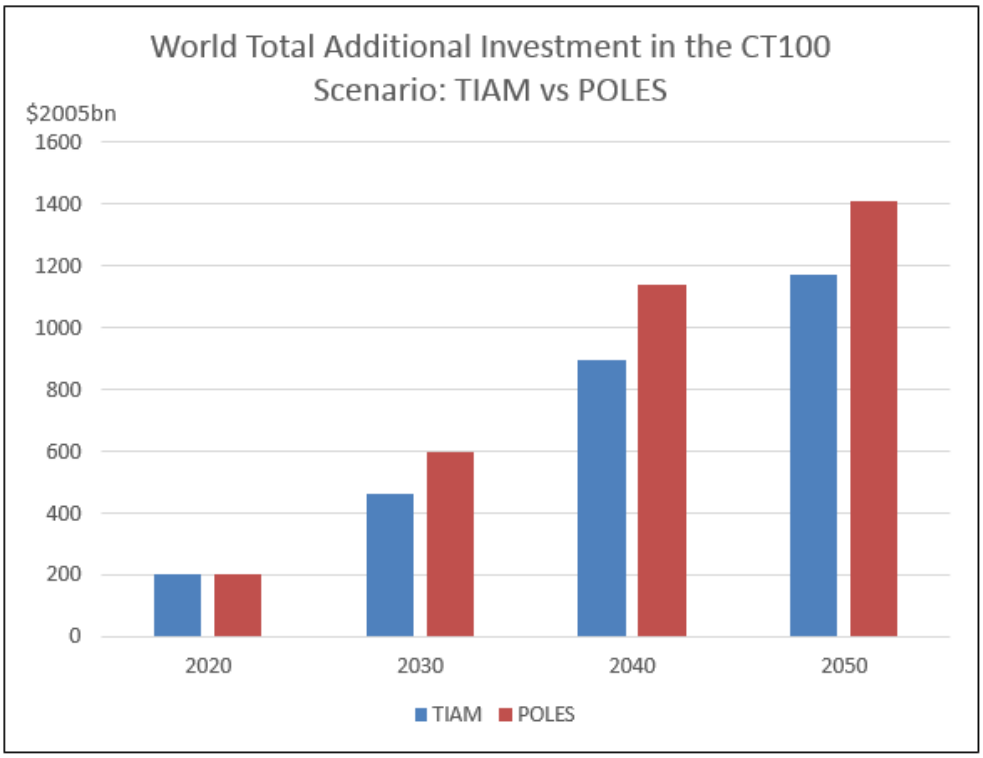
POLES

a. Investment in the electricity sector
New installed electric capacity (MW) in the year considered multiplied by specific overnight investment ($/kW) for each technology in each constrained scenario (not discounted, not annuities). Thus, these investments are the total investments in new power capacities in the considered scenario (not as compared to a BAU).

b. Investment in end-use sectors
Investments in demand sectors are estimated on the basis of two variables:
- Expenditures ($) in the end use subsector: final consumption of subsector (toe) multiplied by energy price ($/toe); differences with the BAU, i.e. expenditure savings due to the implementation of a carbon price, are attributed to investments in lower-carbon technologies.
- Emissions abatement costs ($) in the end use subsector, due to the application of a carbon price.

Despite differences in the allocation of investment between the electricity and non-electricity sectors, both TIAM-ECN and POLES suggest a similar overall level of energy efficiency investment required in the scenarios (see Figure 4.1).

Figure 4.1: World total additional investment in the CT100 scenario



In terms of energy results, both models produce similar outcomes in the scenarios.

Table 4.2 Comparison of TIAM-ECN and POLES energy inputs to E3ME

World final energy demand (% difference from baseline)				
	2020	**2030**	**2040**	**2050**
TIAM-ECN_40	-2.0	-3.1	-3.4	-4.6
POLES_40	-1.2	-4.8	-5.6	-5.3
TIAM-ECN _70	-2.7	-5.6	-6.3	-7.2
POLES_70	-2.2	-7.9	-8.9	-8.6
TIAM-ECN _100	-3.9	-7.3	-8.5	-9.5
POLES_100	-3.1	-10.4	-11.5	-11.3
World secondary energy demand – electricity (% difference from baseline)				
	2020	**2030**	**2040**	**2050**
TIAM-ECN _40	-3.2	-8.9	-5.9	-5.8
POLES_40	-0.6	-3.0	-4.1	-4.6
TIAM-ECN _70	-3.9	-11.1	-8.4	-8.6
POLES_70	-1.0	-4.4	-5.5	-6.0
TIAM-ECN _100	-4.4	-12.4	-9.3	-9.4
POLES_100	-1.3	-5.5	-6.5	-7.1
Source(s): TIAM (ECN) and POLES (Enerdata).				

4.2 Macroeconomic impacts

Global summary

Table 4.3 and Figures 4.2-4.4 provide a summary of the estimated global macroeconomic impacts of the scenarios, in both the TIAM-ECN and POLES cases. The triangles in the figures represent average of macroeconomic outcomes from E3ME using the two set of inputs. The results are presented as percentage differences from the baseline in 2030 and 2050.

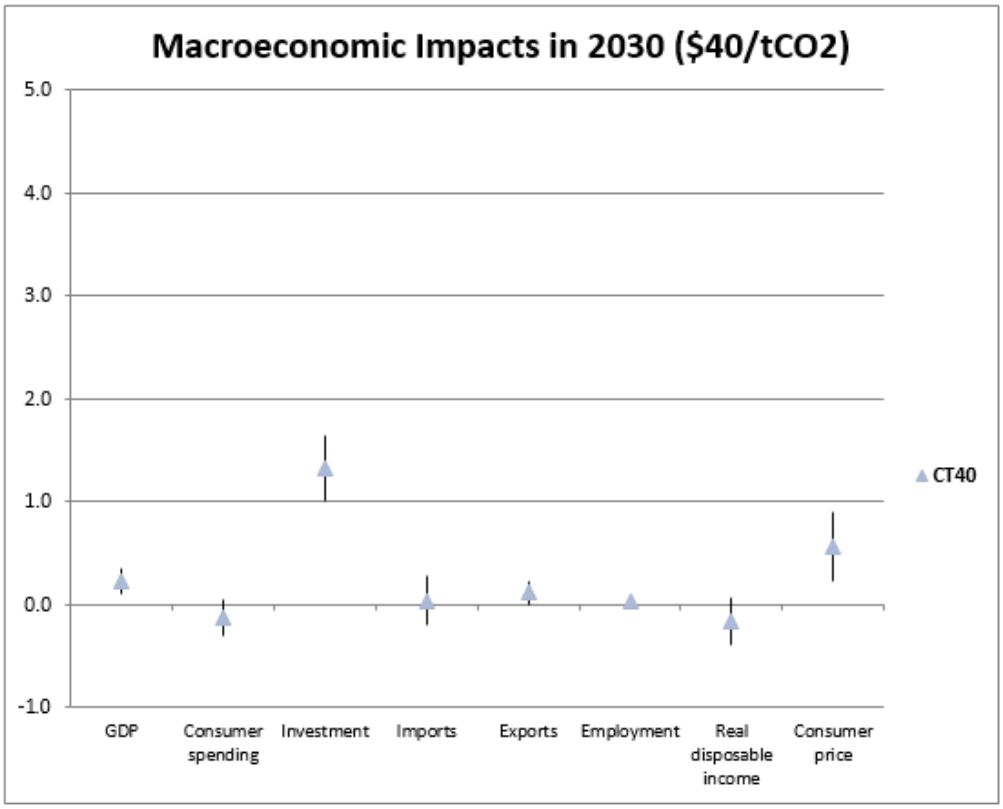
Table 4.3: World macroeconomic impacts in 2030 and 2050, % difference from baseline

	TIAM-ECN inputs			POLES inputs		
2030	**CT40**	**CT70**	**CT40**	**CT70**	**CT40**	**CT70**
GDP	0.1	0.3	0.3	0.4	0.5	0.6
Consumer spending	-0.3	-0.6	-0.7	0.1	0.1	0.0
Investment	1.0	2.1	2.7	1.6	2.5	3.1
Imports	-0.2	-0.5	-0.4	0.3	0.4	0.4
Exports	0.0	-0.1	0.0	0.2	0.3	0.3
Employment	0.0	0.0	0.0	0.1	0.1	0.1
Real disposable income	-0.4	-0.7	-0.8	0.1	0.1	0.0
Consumer price	0.9	1.4	1.9	0.2	0.3	0.4
2050	**CT40**	**CT70**	**CT40**	**CT70**	**CT40**	**CT70**
GDP	0.2	0.5	0.7	0.4	0.6	0.7
Consumer spending	-0.2	-0.3	-0.4	0.0	-0.1	-0.3
Investment	1.4	2.9	3.7	2.3	3.5	4.5
Imports	0.0	0.1	0.1	0.3	0.4	0.5
Exports	0.1	0.4	0.3	0.2	0.3	0.3
Employment	0.0	-0.1	0.0	0.1	0.1	0.2
Real disposable income	-0.2	-0.2	-0.2	-0.1	-0.2	-0.3
Consumer price	0.7	0.7	0.9	0.4	0.5	0.6

Source(s): E3ME, Cambridge Econometrics.

Macroeconomic results in 2030 from E3ME show a wider range of outcomes reflecting input assumptions between TIAM-ECN and POLES. The range of economic outcomes become much smaller by 2050.

Figure 4.2: World macroeconomic impacts in 2030 and 2050 in the $40/tCO2 scenario, % difference from baseline



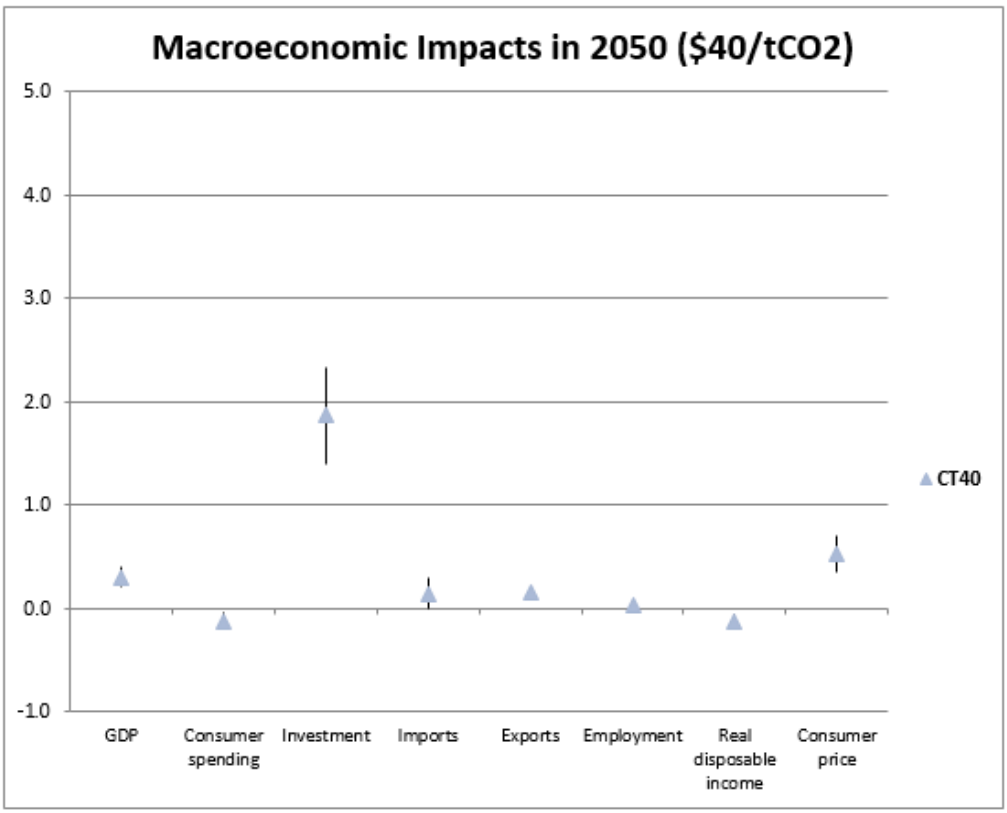
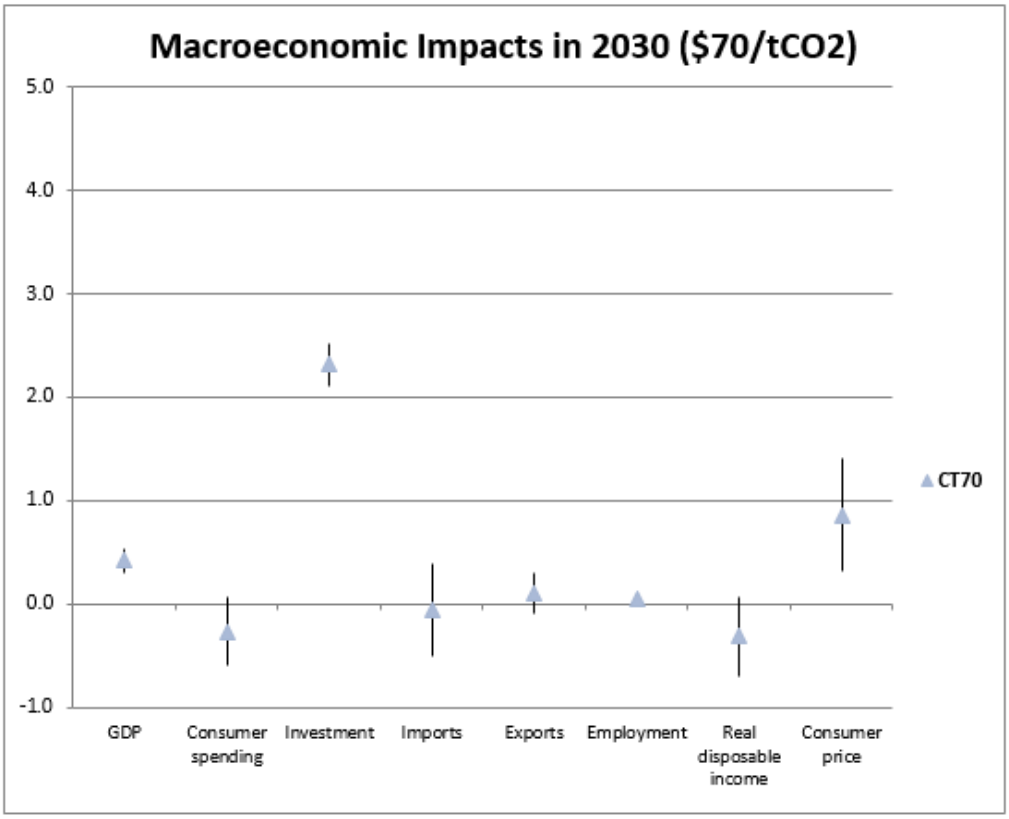


Figure 4.3: World macroeconomic impacts in 2030 and 2050 in the $70/tCO2 scenario, % difference from baseline



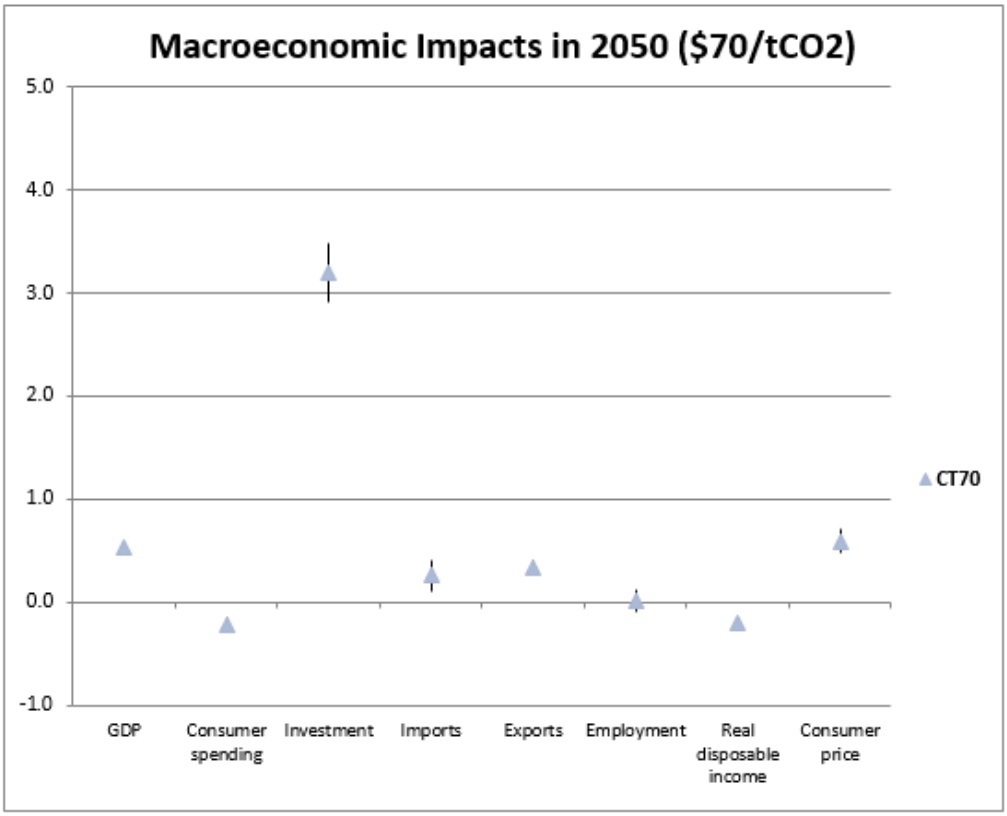
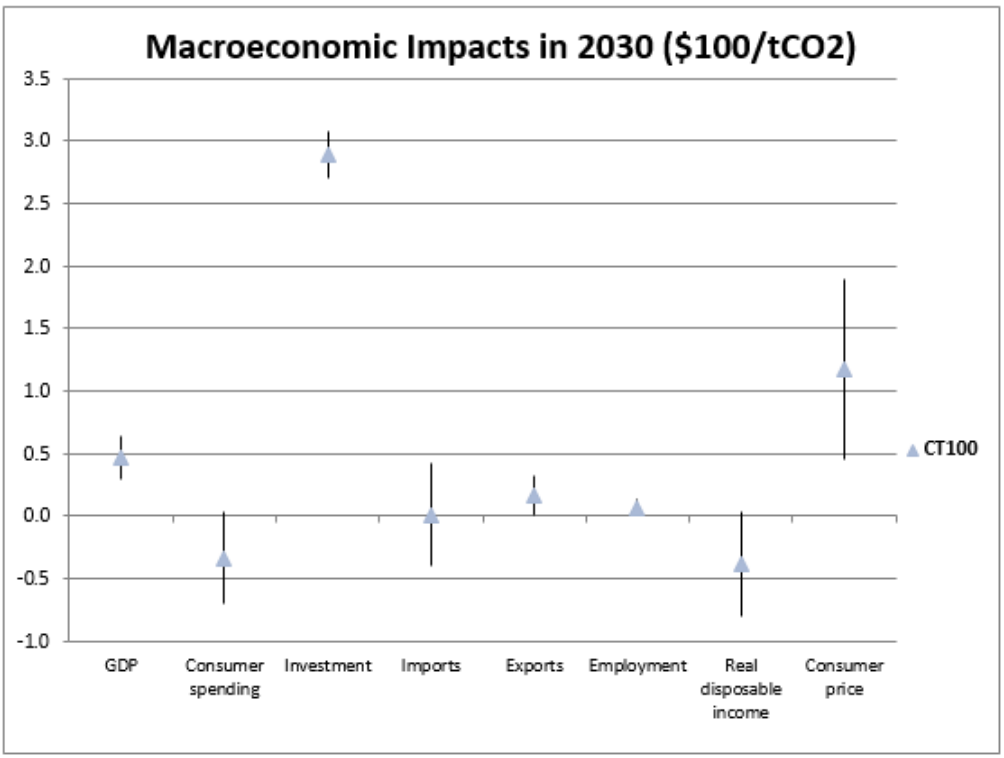
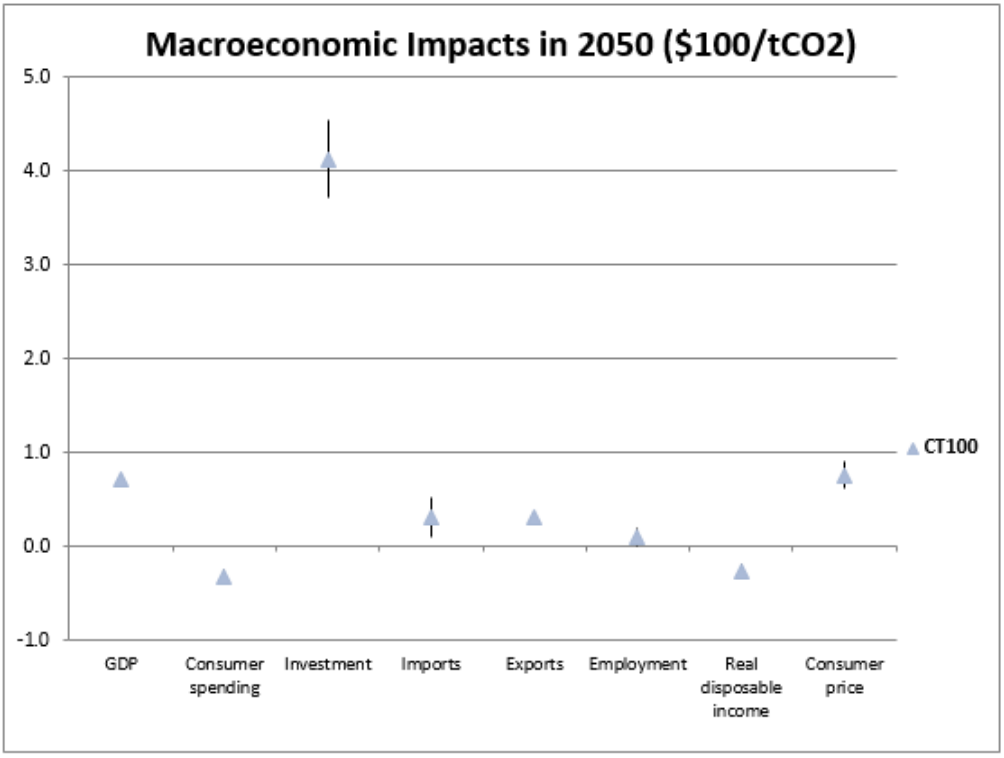


Figure 4.4: World macroeconomic impacts in 2030 and 2050 in the $100/tCO2 scenario, % difference from baseline





TIAM-ECN results summary

The E3ME results using inputs from TIAM-ECN suggest positive GDP outcomes from the energy efficiency scenarios in all cases. The positive impacts on global GDP are driven by the additional investment in the scenarios. There are reductions in consumer demand in the scenarios due to falls in real disposable income, as many prices in the scenarios are higher. The higher price is a result of funding the additional energy efficiency investment through increasing electricity prices and additional costs to industries.

There is almost no change in global employment. However, employment results vary a great deal between regions. For most regions the employment impacts are positive but employment falls in some regions where the domestic economy is affected by higher prices and trade relationships with the rest of the world.

POLES results summary

GDP impacts using the POLES inputs are also positive, and slightly more positive than the GDP results derived from TIAM-ECN inputs. The POLES model suggests slightly higher total levels of energy efficiency investment required in the scenarios. It is also clear that where the investments are assumed to take place is important in explaining the differences.

- In POLES, the additional investment required in the electricity sector is small in the scenarios, resulting in a smaller increase in electricity prices than in TIAM-ECN. This, however, is countered by higher costs to industry from the investments they must make. Overall the results suggest higher price impacts in TIAM-ECN than in POLES.
- Additional residential and commercial investments in POLES are much larger than in TIAM-ECN. Our assumptions that the government pays for residential and commercial investment, and that the scenarios are revenue neutral, means that, in the case of POLES, income taxes must be increased to fund the additional government spending. In TIAM-ECN, however, the government has additional revenues to reduce income taxes compared to the baseline. Income taxes affect real disposable income directly and this can be seen in the E3ME results.

4.3 Results by G20 country

GDP

GDP by G20 country is given in Table 4.4. It should be noted that E3ME does not cover Saudi Arabia or South Africa separately. Instead the results for these two regions are proxied by results from E3ME's OPEC and Rest of World regions respectively.

The results by region vary a lot depending on the input assumptions of where the energy efficiency investment takes place, both in term of sectors and regions, as well as the actual level of investment. These differences feed through in the modelling assumptions of how investments are paid for, affecting the economic results produced by E3ME. The E3ME model also covers the trade impacts between regions from the additional investment and the reduction in energy demand in the scenarios. We therefore would expect the economic results by region to be:

- A reduction in energy exports in regions exporting energy, e.g. OPEC.

- An improvement in the trade balance in regions where energy is imported.
- Increased trade and domestic demand for energy-efficient goods and services, as well as raw materials for construction of energy-efficient investment goods (e.g. mechanical engineering and metal goods). Higher exports from regions with a comparative advantage in these types of products and higher imports for countries that do not produce these goods or are less competitive in their production.
- A reduction in real disposable income (and consumption) in regions where investments are funded by government (through income tax rises).
- A smaller reduction in real disposable incomes in regions where investments are funded through higher prices (as E3ME does not assume 100% cost pass-through rates for industries). However, this will be offset by lower energy bills for industries due to higher efficiency.

Table 4.4: GDP results for 2030 and 2050, presented as % difference from baseline

	TIAM-ECN inputs			POLES inputs		
	ct40	ct70	ct100	ct70	ct40	ct100
2030						
European Union	0.1	0.2	0.3	0.4	0.5	0.7
Germany	-0.1	0.0	-0.1	0.4	0.5	0.5
France	0.2	0.3	0.4	0.4	0.7	0.8
Italy	0.1	0.1	0.3	0.2	0.3	0.4
United Kingdom	0.1	0.1	0.1	0.1	0.2	0.3
Turkey	0.0	0.1	0.2	0.3	0.5	0.7
United States	0.3	0.1	0.2	0.3	0.5	0.6
Japan	0.0	-0.2	-0.2	0.4	0.7	0.9
Canada	0.0	0.0	-0.2	0.3	0.4	0.5
Australia	0.5	0.5	0.4	0.3	0.5	0.6
Russia	-0.7	-0.9	-0.8	0.2	0.2	0.2
China	0.5	1.6	1.6	0.8	1.2	1.2
India	0.8	1.6	1.7	0.2	0.4	0.4
Brazil	0.2	1.3	1.5	0.4	0.7	1.0
Mexico	-0.4	-1.5	-1.9	0.3	0.5	0.6
Argentina	-0.4	-0.5	-0.4	0.3	0.5	0.7
Republic of Korea	0.1	0.3	0.9	0.3	0.5	0.6
Indonesia	-0.4	-0.2	0.1	0.1	0.5	0.7
Proxy for Saudi Arabia	-1.4	-1.9	-2.3	0.2	0.2	0.0
Proxy for South Africa	-0.8	-1.3	-1.5	-0.3	-0.5	-0.6
2050						
European Union	0.3	0.5	0.7	0.6	0.8	1.0
Germany	0.1	0.3	0.5	0.4	0.5	0.5
France	0.4	0.7	0.9	0.7	0.9	1.1
Italy	0.2	0.5	0.7	0.3	0.4	0.5
United Kingdom	0.3	0.2	0.3	0.3	0.4	0.4
Turkey	0.0	0.2	0.4	0.6	1.0	1.3
United States	0.4	0.5	0.6	0.4	0.6	0.7
Japan	0.2	-0.1	-0.2	0.7	0.9	1.1
Canada	-0.2	-0.2	-0.2	0.4	0.6	0.7
Australia	0.4	0.6	0.1	0.3	0.4	0.5
Russia	-0.1	-0.2	-0.3	-0.4	-0.5	-0.6
China	0.5	1.8	1.8	0.4	0.6	0.9
India	0.0	0.6	1.8	0.9	0.9	1.1
Brazil	0.9	1.0	0.8	0.3	0.6	0.9
Mexico	-0.1	-0.3	0.3	0.1	0.2	0.3
Argentina	-0.4	-0.2	0.0	0.3	0.4	0.6
Republic of Korea	0.4	0.7	0.7	0.4	0.7	1.0
Indonesia	2.4	3.7	3.8	-0.5	0.0	0.4
Proxy for Saudi Arabia	-0.9	-1.0	-1.1	0.4	0.4	0.2
Proxy for South Africa	-0.8	-1.5	-1.9	-0.1	-0.2	-0.3

Source(s): E3ME, Cambridge Econometrics.

Components of GDP

Tables 4.5 to 4.8 provide results for the components of GDP in each G20 country: consumer spending, investment, exports and imports (government spending is treated as exogenous and so there is no change).

Table 4.5: Consumer spending results for 2030 and 2050, presented as % difference from baseline

	TIAM-ECN inputs			POLES inputs		
	ct40	ct70	ct100	ct70	ct40	ct100
2030						
European Union	-0.3	-0.4	-0.6	0.1	0.0	0.0
Germany	-0.5	-0.7	-1.1	0.0	0.0	0.0
France	0.0	0.0	0.1	0.4	0.4	0.5
Italy	-0.2	-0.3	-0.5	0.0	0.0	-0.1
United Kingdom	-0.2	-0.3	-0.3	0.0	0.0	0.0
Turkey	-0.2	-0.2	-0.4	0.0	0.1	0.1
United States	-0.2	-0.7	-0.7	0.2	0.3	0.3
Japan	-0.5	-1.0	-1.1	-0.1	-0.2	-0.2
Canada	-0.6	-0.7	-1.2	0.0	0.0	0.0
Australia	-0.1	-0.7	-0.9	0.1	0.1	0.1
Russia	0.4	0.5	0.8	0.4	0.5	0.6
China	0.5	1.2	1.4	0.4	0.5	0.5
India	-0.4	-0.3	-0.3	0.4	0.3	0.1
Brazil	-0.1	0.1	0.0	0.1	0.3	0.5
Mexico	-1.0	-2.3	-2.9	-0.1	-0.2	-0.3
Argentina	-0.2	-0.6	-0.7	-0.2	-0.4	-0.5
Republic of Korea	-0.1	-0.2	-0.2	-0.1	-0.1	-0.1
Indonesia	-0.8	-1.1	-1.1	-1.4	-1.1	-0.9
Proxy for Saudi Arabia	-1.1	-1.7	-2.1	0.4	0.3	-0.1
Proxy for South Africa	-1.3	-2.3	-2.9	-0.8	-1.1	-1.4
2050						
European Union	-0.2	-0.2	-0.2	-0.1	-0.2	-0.3
Germany	-0.5	-0.5	-0.3	-0.2	-0.3	-0.4
France	0.0	0.1	0.1	1.0	1.3	1.4
Italy	-0.1	-0.1	-0.2	-0.2	-0.4	-0.5
United Kingdom	-0.3	-0.5	-0.6	-0.2	-0.3	-0.4
Turkey	-0.4	-0.1	-0.1	0.4	0.7	1.0
United States	0.2	0.3	0.4	0.1	0.0	0.0
Japan	-0.4	-0.8	-1.3	-0.1	-0.2	-0.2
Canada	-0.7	-0.8	-1.0	-0.1	-0.1	-0.1
Australia	-0.1	0.2	0.0	0.0	-0.1	-0.1
Russia	0.5	0.0	0.0	0.3	0.3	0.4
China	0.7	1.8	2.1	-0.1	-0.3	-0.7
India	-0.5	-0.2	0.0	1.5	1.3	0.9
Brazil	-0.2	-0.4	-0.7	-0.3	0.1	0.4
Mexico	-0.7	-1.1	-0.5	-0.3	-0.4	-0.6
Argentina	-0.4	-0.6	-0.7	-1.0	-1.7	-2.2
Republic of Korea	0.0	-0.4	-0.5	-0.1	-0.2	-0.3
Indonesia	0.1	0.2	0.3	-3.8	-3.3	-2.7
Proxy for Saudi Arabia	-1.1	-2.2	-2.1	0.7	0.6	-0.2
Proxy for South Africa	-2.0	-4.3	-5.1	-0.7	-1.0	-1.3

Source(s): E3ME, Cambridge Econometrics.

Table 4.6: Investment results for 2030 and 2050, presented as % difference from baseline

	TIAM-ECN inputs			POLES inputs		
	ct40	ct70	ct100	ct70	ct40	ct100
2030						
European Union	0.3	1.0	1.8	1.7	2.4	3.1
Germany	0.1	0.3	0.5	1.3	1.8	2.2
France	0.1	0.5	1.3	1.4	1.9	2.4
Italy	0.4	1.1	2.4	1.0	1.4	2.0
United Kingdom	0.0	0.2	0.9	1.2	1.7	2.1
Turkey	0.8	0.7	1.4	1.2	2.0	2.8
United States	3.0	3.5	3.8	1.2	2.0	2.6
Japan	0.2	0.6	0.8	0.6	1.2	1.8
Canada	0.4	0.8	0.9	1.0	1.5	1.9
Australia	2.1	3.4	4.0	1.1	1.7	2.0
Russia	-2.4	-0.9	-0.5	2.5	3.8	5.0
China	1.4	4.2	4.2	2.9	4.4	4.6
India	0.8	2.4	2.6	0.5	1.1	1.1
Brazil	0.9	5.2	6.7	1.8	2.7	3.6
Mexico	2.1	1.1	1.8	2.3	3.6	4.7
Argentina	-1.5	-0.8	0.3	2.7	4.2	5.7
Republic of Korea	0.2	1.0	3.9	1.0	1.4	1.7
Indonesia	0.1	1.6	3.3	3.1	4.5	5.7
Proxy for Saudi Arabia	-0.2	1.2	1.1	2.2	3.5	4.9
Proxy for South Africa	-0.9	-0.9	-0.3	0.0	0.3	0.2
2050						
European Union	0.8	2.1	2.9	3.2	4.6	5.7
Germany	0.0	0.3	0.6	2.3	3.1	3.6
France	0.5	2.0	3.3	2.8	3.9	4.7
Italy	0.9	2.4	3.1	1.5	2.5	3.2
United Kingdom	0.1	0.7	1.3	1.9	2.7	3.3
Turkey	0.6	1.2	2.0	2.4	4.3	5.7
United States	1.6	1.9	2.4	2.3	3.7	4.6
Japan	0.6	0.7	0.8	1.8	2.4	2.9
Canada	0.9	0.7	1.1	2.3	3.6	4.7
Australia	1.7	1.8	2.3	1.8	2.5	3.0
Russia	1.3	3.3	4.7	4.1	5.8	7.0
China	2.3	5.1	5.2	1.9	2.9	4.2
India	-0.2	2.2	4.5	2.5	2.7	3.8
Brazil	1.8	3.4	2.0	2.1	3.3	4.3
Mexico	1.8	1.7	3.8	1.9	3.5	4.7
Argentina	-0.8	1.3	4.3	4.2	6.8	9.0
Republic of Korea	1.9	3.1	3.6	2.0	3.3	4.3
Indonesia	8.8	13.6	14.6	2.6	4.1	5.3
Proxy for Saudi Arabia	-0.4	0.6	4.4	2.8	4.3	5.5
Proxy for South Africa	0.2	1.0	1.3	0.2	0.3	0.4

Source(s): E3ME, Cambridge Econometrics.

Table 4.7: Exports results for 2030 and 2050, presented as % difference from baseline

	TIAM-ECN inputs			POLES inputs		
	ct40	ct70	ct100	ct70	ct40	ct100
2030						
European Union	0.2	0.2	0.2	0.3	0.4	0.5
Germany	0.4	0.5	0.6	0.4	0.6	0.7
France	0.2	0.2	0.2	0.4	0.5	0.6
Italy	0.1	0.1	0.2	0.4	0.6	0.6
United Kingdom	0.2	-0.1	-0.1	0.1	0.2	0.2
Turkey	0.0	0.0	0.2	0.7	1.0	1.2
United States	0.4	0.6	0.7	0.4	0.6	0.7
Japan	0.4	0.5	0.7	0.4	0.7	0.9
Canada	0.6	0.8	0.9	0.3	0.5	0.6
Australia	0.1	0.1	0.2	0.1	0.1	0.2
Russia	-2.3	-4.1	-4.8	-1.6	-2.5	-3.6
China	0.3	0.4	0.5	0.3	0.4	0.5
India	-0.4	-1.2	-1.4	-0.4	-0.6	-0.9
Brazil	0.3	0.5	0.7	0.2	0.3	0.4
Mexico	0.8	0.8	0.9	0.3	0.5	0.6
Argentina	0.0	-0.1	0.0	0.1	0.2	0.2
Republic of Korea	0.1	0.2	0.2	0.2	0.2	0.2
Indonesia	-0.1	-0.3	-0.2	0.0	-0.1	-0.1
Proxy for Saudi Arabia	-3.3	-5.5	-6.2	-0.8	-1.5	-2.2
Proxy for South Africa	0.0	0.0	0.1	0.3	0.4	0.5
2050						
European Union	0.2	0.3	0.5	0.3	0.4	0.4
Germany	0.2	0.4	0.7	0.4	0.5	0.5
France	0.1	0.3	0.6	0.2	0.2	0.1
Italy	0.3	0.6	0.9	0.3	0.3	0.4
United Kingdom	0.1	0.0	0.0	0.0	0.0	-0.1
Turkey	0.2	0.5	0.9	0.9	1.3	1.7
United States	0.6	0.8	0.9	0.6	0.9	1.1
Japan	0.4	0.7	1.1	0.6	0.9	1.1
Canada	0.4	0.7	0.9	0.4	0.5	0.6
Australia	0.2	0.4	0.5	0.0	0.0	0.1
Russia	-2.5	-2.5	-4.2	-4.3	-5.9	-7.1
China	0.5	0.9	1.1	0.4	0.5	0.7
India	-0.4	-0.6	-1.0	-0.5	-0.8	-1.0
Brazil	0.2	0.6	0.8	0.4	0.5	0.7
Mexico	0.4	0.4	0.5	0.5	0.6	0.8
Argentina	0.1	0.1	0.1	0.2	0.4	0.5
Republic of Korea	0.2	0.4	0.3	0.1	0.2	0.3
Indonesia	0.2	0.2	0.2	0.0	0.0	0.0
Proxy for Saudi Arabia	-1.9	-2.4	-4.9	-0.7	-1.5	-2.2
Proxy for South Africa	0.1	0.4	0.4	0.3	0.4	0.5

Source(s): E3ME, Cambridge Econometrics.

Table 4.8: Imports results for 2030 and 2050, presented as % difference from baseline

	TIAM-ECN inputs			POLES inputs		
	ct40	ct70	ct100	ct70	ct40	ct100
2030						
European Union	-0.5	-0.5	-0.1	0.4	0.6	0.8
Germany	-0.2	-0.4	-0.3	0.5	0.8	1.1
France	-1.0	-1.3	-0.8	-1.2	-1.5	-1.6
Italy	-0.2	-0.1	0.5	0.8	1.0	1.3
United Kingdom	-1.0	-1.4	-0.8	0.5	0.6	0.7
Turkey	0.0	-0.1	0.0	0.5	0.8	1.1
United States	0.9	0.6	0.4	0.5	0.6	0.6
Japan	-0.5	-0.5	-0.6	-0.6	-0.9	-0.9
Canada	0.3	0.7	0.7	0.4	0.6	0.7
Australia	0.1	0.4	0.5	0.2	0.3	0.3
Russia	-0.2	0.4	0.5	0.7	1.1	1.3
China	0.6	0.2	0.6	1.0	1.5	1.6
India	-4.2	-6.6	-6.9	0.2	-0.4	-1.0
Brazil	-0.3	-1.0	-0.9	-0.1	0.0	0.1
Mexico	0.6	-0.1	0.0	0.5	0.8	1.1
Argentina	-0.2	-0.2	0.3	0.4	0.6	0.8
Republic of Korea	-0.2	-0.3	-0.2	-0.2	-0.3	-0.4
Indonesia	-0.1	-0.1	0.2	-0.1	0.3	0.5
Proxy for Saudi Arabia	-0.3	-0.4	-0.5	0.3	0.4	0.7
Proxy for South Africa	-0.2	-0.4	-0.3	0.4	0.5	0.6
2050						
European Union	-0.8	-0.4	-0.1	0.7	1.0	1.3
Germany	-1.1	-1.1	-0.8	0.8	1.2	1.5
France	-2.5	-1.8	-1.3	0.4	0.7	0.9
Italy	0.1	0.7	0.8	0.7	1.0	1.3
United Kingdom	-2.1	-2.0	-1.8	-0.2	-0.2	-0.1
Turkey	0.1	0.5	0.6	1.1	2.0	2.6
United States	0.1	0.1	0.5	0.4	0.5	0.5
Japan	-0.5	-0.6	-0.7	-0.5	-0.4	-0.4
Canada	0.6	0.9	1.1	0.6	0.9	1.1
Australia	0.3	0.5	1.5	0.3	0.5	0.6
Russia	0.5	0.9	0.9	0.9	1.3	1.5
China	2.0	2.0	2.4	0.7	1.0	1.3
India	-1.5	-1.6	-4.7	1.1	0.3	-0.3
Brazil	-2.5	-2.1	-2.6	-0.1	0.4	0.9
Mexico	0.2	-0.5	0.5	0.5	0.9	1.1
Argentina	0.0	0.6	1.6	0.4	0.7	1.0
Republic of Korea	0.0	-0.2	-0.2	-0.1	-0.3	-0.4
Indonesia	0.9	1.2	1.5	-0.8	-0.5	-0.1
Proxy for Saudi Arabia	-0.4	-0.6	-0.3	0.4	0.6	0.6
Proxy for South Africa	0.0	0.1	0.2	0.4	0.5	0.7

Source(s): E3ME, Cambridge Econometrics.

Table 4.9: Employment results for 2030 and 2050, presented as % difference from baseline

	TIAM-ECN inputs			POLES inputs		
	ct40	ct70	ct100	ct70	ct40	ct100
2030						
European Union	0.1	0.1	0.2	0.2	0.2	0.3
Germany	0.0	0.0	0.1	0.2	0.2	0.3
France	0.1	0.2	0.3	0.4	0.5	0.6
Italy	0.1	0.1	0.2	0.2	0.2	0.3
United Kingdom	0.0	-0.1	0.0	0.1	0.1	0.1
Turkey	0.2	0.2	0.3	0.2	0.3	0.5
United States	0.1	0.0	0.0	0.1	0.1	0.1
Japan	-0.1	-0.1	-0.1	0.0	0.1	0.1
Canada	-0.1	-0.1	-0.2	0.0	0.0	0.0
Australia	-0.1	-0.1	0.0	0.0	0.1	0.1
Russia	0.0	0.0	0.0	0.1	0.1	0.1
China	0.0	0.0	0.1	0.0	0.0	0.0
India	0.1	0.1	0.1	0.1	0.2	0.2
Brazil	0.0	0.3	0.3	0.1	0.3	0.4
Mexico	0.1	-0.3	-0.3	0.1	0.2	0.2
Argentina	-0.2	-0.2	0.0	0.3	0.6	0.7
Republic of Korea	0.0	0.1	0.2	0.1	0.1	0.1
Indonesia	0.2	0.2	0.4	-0.2	0.0	0.1
Proxy for Saudi Arabia	-0.2	-0.4	-0.5	0.2	0.4	0.5
Proxy for South Africa	-0.3	-0.5	-0.5	0.0	0.0	0.0
2050						
European Union	0.2	0.2	0.2	0.4	0.5	0.5
Germany	0.0	0.0	0.0	0.4	0.4	0.5
France	0.3	0.5	0.7	1.0	1.2	1.4
Italy	0.1	0.3	0.4	0.3	0.4	0.5
United Kingdom	-0.1	-0.2	-0.2	0.1	0.1	0.1
Turkey	0.1	0.2	0.5	0.6	1.2	1.6
United States	0.0	0.1	0.1	0.0	0.0	0.0
Japan	-0.1	-0.1	-0.3	0.2	0.2	0.3
Canada	-0.2	-0.2	-0.2	0.0	0.0	0.0
Australia	0.0	0.0	0.1	0.1	0.1	0.2
Russia	0.1	0.0	0.1	0.1	0.1	0.2
China	0.0	0.1	0.1	0.0	0.0	0.0
India	-0.1	-0.1	0.0	-0.1	-0.1	0.0
Brazil	0.0	0.0	-0.1	0.1	0.4	0.6
Mexico	-0.1	-0.3	0.1	0.1	0.2	0.2
Argentina	-0.2	-0.1	0.1	0.6	0.9	1.2
Republic of Korea	0.2	0.3	0.3	0.1	0.1	0.2
Indonesia	0.6	0.6	0.8	-0.4	-0.2	0.0
Proxy for Saudi Arabia	0.0	-0.1	-0.2	0.3	0.5	0.5
Proxy for South Africa	-0.5	-0.6	-0.7	0.1	0.2	0.3

Source(s): E3ME, Cambridge Econometrics.

4.4 Sectoral impacts

For detailed country-specific output and employment results by sector please see Appendix C.

Output Table 4.10 summarises the impacts on global output by broad sector. It is clear that the biggest reductions in output come from traditional mining, fossil fuels and utilities. Most of the output gains are in construction and manufacturing, which are the sectors that are expected to benefit most from the additional energy efficiency investment.

Employment Table 4.11 summarises the global employment impacts by broad sector. It is clear that the employment results follow the results for sectoral output, with reductions coming from mining, fossil fuels and utilities. Employment gains are in the construction and manufacturing sectors.

Table 4.10: World output by broad sector in 2030 and 2050, presented as % difference from baseline

	TIAM-ECN inputs			POLES inputs		
	ct40	ct70	ct100	ct70	ct40	ct100
2030						
Agriculture	-0.1	-0.1	-0.1	0.0	0.1	0.1
Mining and utilities	-1.2	-2.2	-2.9	-0.3	-0.6	-1.0
Manufacturing	0.2	0.5	0.8	0.7	1.0	1.2
Construction	0.0	0.2	0.3	0.6	1.0	1.3
Distribution and retail	-0.2	-0.5	-0.6	0.2	0.4	0.4
Transport and warehousing	0.0	0.0	0.0	0.2	0.3	0.3
Hotels and catering	0.1	0.3	0.3	0.2	0.3	0.3
Communications and computing	0.1	0.2	0.3	0.4	0.6	0.7
Banking and business sectors	0.2	0.3	0.4	0.2	0.4	0.5
Real estate and other business services	0.1	0.1	0.1	0.2	0.3	0.4
Public administration	0.0	0.0	0.0	0.1	0.1	0.1
Miscellaneous	0.0	0.1	0.2	0.1	0.2	0.2
Total	0.0	0.0	0.1	0.3	0.5	0.6
2050						
Agriculture	0.1	0.2	0.3	0.0	0.1	0.1
Mining and utilities	-1.0	-2.2	-2.6	-0.4	-0.7	-0.9
Manufacturing	0.8	1.5	1.7	0.6	0.9	1.2
Construction	0.2	0.5	0.7	1.5	2.3	3.0
Distribution and retail	0.1	0.2	0.3	0.2	0.4	0.5
Transport and warehousing	0.1	0.2	0.3	0.1	0.2	0.3
Hotels and catering	0.1	0.2	0.3	0.0	0.1	0.2
Communications and computing	0.3	0.6	0.9	0.5	0.7	0.9
Banking and business sectors	0.3	0.5	0.6	0.2	0.3	0.4
Real estate and other business services	0.1	0.1	0.1	0.2	0.3	0.4
Public administration	0.0	0.0	0.0	0.0	0.0	0.1
Miscellaneous	0.1	0.2	0.3	0.1	0.1	0.2
Total	0.2	0.4	0.5	0.3	0.5	0.6

Source(s): E3ME, Cambridge Econometrics.

Table 4.11: World Employment by broad sector in 2030 and 2050, presented as % difference from baseline

	TIAM-ECN inputs			POLES inputs		
	ct40	ct70	ct100	ct70	ct40	ct100
2030						
Agriculture	-0.1	-0.1	-0.1	0.0	0.0	0.0
Mining and utilities	-2.5	-4.3	-4.5	-0.3	-0.4	-0.4
Manufacturing	0.1	0.1	0.2	0.2	0.3	0.4
Construction	0.1	0.2	0.3	0.2	0.3	0.4
Distribution and retail	0.0	-0.1	-0.2	0.0	0.1	0.1
Transport and warehousing	0.1	0.2	0.3	0.1	0.2	0.2
Hotels and catering	0.0	0.2	0.3	0.1	0.3	0.3
Communications and computing	0.0	0.1	0.2	0.0	0.1	0.2
Banking and business sectors	0.0	0.0	0.0	0.1	0.2	0.2
Real estate and other business services	0.0	0.0	0.0	0.1	0.2	0.2
Public administration	0.0	0.0	0.0	0.0	0.0	0.0
Miscellaneous	0.0	0.0	0.0	0.0	0.0	0.0
Total	0.0	0.0	0.0	0.1	0.1	0.1
2050						
Agriculture	-0.1	-0.1	-0.1	0.0	0.0	0.1
Mining and utilities	-6.2	-10.4	-10.9	-1.0	-2.0	-1.4
Manufacturing	0.3	0.5	0.7	0.3	0.5	0.6
Construction	0.0	-0.1	0.0	0.4	0.8	1.0
Distribution and retail	0.1	0.2	0.3	0.0	0.0	0.1
Transport and warehousing	-0.1	-0.1	0.0	-0.1	-0.1	0.0
Hotels and catering	0.0	0.2	0.4	-0.3	-0.1	0.1
Communications and computing	0.0	0.1	0.2	0.1	0.1	0.2
Banking and business sectors	0.2	0.1	0.0	0.1	0.1	0.1
Real estate and other business services	0.0	-0.1	0.0	0.1	0.2	0.2
Public administration	0.0	-0.1	-0.1	0.0	0.0	0.0
Miscellaneous	0.0	0.0	0.0	0.0	0.0	0.1
Total	0.0	-0.1	0.0	0.1	0.1	0.2

Source(s): E3ME, Cambridge Econometrics.

4.5 Additional energy demand (rebound effects)

Rebound effects are estimated from the changes in economic activity resulting from the energy efficiency policies in the scenarios. These changes in economic activity rates include scale, composition and some technique effects, so we should not expect to see a one-to-one relationship between increases in economic output and rebounds in energy demand.

In estimating the rebound effects we have not carried out a whole new set of model scenarios (in which we would need to re-specify the energy demand equations from exogenously taking input assumptions to solving endogenously). Instead we have used E3ME's estimated activity demand elasticities to estimate the impacts of higher rates of economic production on energy demand. Table 4.12 provides estimates in absolute terms of the rebound effects.

Table 4.12: Total rebound in final energy demand (excluding non-energy uses) in G20 countries (excluding Saudi Arabia and South Africa), m toe

	TIAM-ECN inputs			POLES inputs		
	ct40	ct70	ct100	ct70	ct40	ct100
2030						
European Union	-0.3	0.6	1.8	2.2	3.0	3.7
Germany	-0.3	-0.4	-0.4	0.2	0.3	0.4
France	0.2	0.3	0.6	0.4	0.5	0.6
Italy	0.2	0.3	0.8	0.3	0.4	0.5
United Kingdom	-0.1	0.0	0.2	0.2	0.2	0.3
Turkey	0.1	0.1	0.1	0.4	0.7	0.9
United States	4.7	3.9	4.1	3.5	5.1	6.1
Japan	-0.8	-1.6	-1.7	0.2	0.4	0.6
Canada	-0.1	0.1	-0.1	0.1	0.2	0.2
Australia	0.3	0.3	0.2	0.2	0.3	0.3
Russia	-0.5	0.2	0.6	0.6	0.9	1.1
China	4.1	5.6	6.2	6.4	12.4	14.7
India	-0.6	0.1	0.6	4.2	4.2	3.4
Brazil	0.1	1.2	1.6	0.5	1.0	1.4
Mexico	-0.5	-2.6	-3.2	0.5	0.8	0.9
Argentina	0.0	0.0	0.0	0.0	0.1	0.1
Republic of Korea	0.3	0.8	1.8	0.5	0.7	0.9
Indonesia	-0.1	0.1	0.4	-0.2	0.3	0.6
2050						
European Union	1.3	4.3	6.0	3.4	4.4	5.2
Germany	-0.2	0.0	0.3	0.3	0.3	0.4
France	0.3	0.6	0.9	1.1	1.4	1.6
Italy	0.6	1.4	1.7	0.3	0.5	0.6
United Kingdom	0.0	0.1	0.2	0.1	0.2	0.2
Turkey	0.1	0.4	0.5	1.6	2.7	3.4
United States	6.8	9.6	12.6	3.4	4.6	5.7
Japan	-0.4	-1.1	-1.8	0.7	0.8	1.0
Canada	-0.1	-0.1	-0.1	0.3	0.4	0.6
Australia	-0.3	4.6	4.4	3.2	2.5	15.0
Russia	0.9	3.2	5.8	1.0	1.2	1.4
China	16.0	22.8	24.6	11.0	16.8	19.7
India	-4.2	2.9	8.2	36.4	28.9	20.6
Brazil	0.9	1.9	-0.1	0.4	1.4	2.4
Mexico	-0.7	-2.0	1.1	0.5	0.9	1.2
Argentina	0.0	0.0	0.2	0.0	0.0	0.0
Republic of Korea	1.0	1.7	2.0	0.6	1.0	1.3
Indonesia	1.1	1.8	2.0	-1.6	-0.6	0.2

Source(s): E3ME, Cambridge Econometrics.

5 Conclusions

This report summarises the key findings and methodology used in estimating the macroeconomic impacts associated with realising energy efficiency improvements in the G20 countries. The analysis is based on the results from two bottom-up energy system models, TIAM-ECN and POLES, and uses the E3ME macroeconomic model.

The E3ME model is a global tool that links energy, environment and the economy together. One of the model's key features is its empirical foundation, with model relationships validated from past historical data. Unlike the more common CGE modelling approach, E3ME does not rely on theoretical economic assumptions about optimising behaviour and this makes it a suitable tool for assessing low and negative-cost energy efficiency measures.

Although energy demand is endogenous in E3ME, for this project the equations have been fixed to allow detailed inputs from TIAM-ECN and POLES. For each of the two sets of model inputs, there are four runs: baseline, \$40/tCO_2, \$70/tCO_2, and \$100/tCO_2. The carbon prices are used in the energy models as proxies to stimulate investment in energy efficiency; in the economic model, however, we do not include a carbon price.

Modelling inputs to E3ME include changes in energy demand by users and energy types, energy prices, power sector capacity and, most importantly, the necessary investment required in the electricity and non-electricity sectors. Further assumptions are made with regard to how these investments are funded. For electricity, it is assumed to be reflected in electricity prices. For industries it is added to their costs. Government is assumed to fund investment in the households and commercial sectors and we assume revenue neutrality by adjusting income tax rates.

The macroeconomic results from E3ME produce a similar message for both sets of inputs: Positive global GDP outcomes can be expected in the energy efficiency scenarios. The positive outcomes are driven mainly by investment in the scenarios, which stimulates the economy despite higher electricity prices, costs or taxes that have to be paid to fund the investment. The differences between the TIAM-ECN and POLES scenarios can be explained by where and when these investments are assumed to take place in the economy.

Economic results for each G20 member vary depending on country-specific factors, including additional investment and changes in prices in that particular country. Since inputs are non-uniform, some countries benefit from additional investment more than others, while some lose out from competitiveness and price effects.

Net changes in total employment at the global level are very small. However, employment results at country and sector level vary more substantially. While traditional jobs in fossil fuel production fall, they are compensated by increases in employment demand in the construction and machinery sectors that benefit from these additional energy efficiency investments.

6 References

DG Energy (2013) 'Employment Effects of selected scenarios from the Energy roadmap 2050', DG Energy, European Commission http://ec.europa.eu/energy/observatory/studies/doc/2013_report_employment_effects_roadmap_2050.pdf

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Appendix A E3ME Description

A.1 Introduction

Overview

E3ME is a computer-based model of the world's economic and energy systems and the environment. It was originally developed through the European Commission's research framework programmes and is now widely used in Europe and beyond for policy assessment, for forecasting and for research purposes. The global edition is a new version of E3ME which expands the model's geographical coverage from 33 European countries to 53 global regions. It thus incorporates the global capabilities of the previous E3MG model.

Compared to previous model versions, version 6 of E3ME provides:

- better geographical coverage
- better feedbacks between individual European countries and other world economies
- better treatment of international trade with bilateral trade between regions
- a new model of the power sector

This is the most comprehensive model version of E3ME to date and it includes all the previous features of the previous E3MG model.

Recent applications

Recent applications of E3ME include:

- an assessment of the economic and labour market effects of the EU's Energy Roadmap 2050
- contribution to the EU's Impact Assessment of its 2030 environmental targets
- evaluations of the economic impact of removing fossil fuel subsidies
- an assessment of the potential for green jobs in Europe
- an economic evaluation for the EU Impact Assessment of the Energy Efficiency Directive

This model description provides a short summary of the E3ME model. For further details, the reader is referred to the full model manual available online from www.e3me.com.

A.2 E3ME's basic structure and data

The structure of E3ME is based on the system of national accounts, with further linkages to energy demand and environmental emissions. The labour market is also covered in detail, including both voluntary and involuntary unemployment. In total there are 33 sets of econometrically estimated equations, also including the components of GDP (consumption, investment, international trade), prices, energy demand and materials demand. Each equation set is disaggregated by country and by sector.

E3ME's historical database covers the period 1970-2012 and the model projects forward annually to 2050. The main data sources for European countries are Eurostat and the IEA, supplemented by the OECD's STAN database and other sources where appropriate. For regions outside Europe, additional sources for data include the UN, OECD, World Bank, IMF, ILO and national statistics. Gaps in the data are estimated using customised software algorithms.

A.3 The main dimensions of the model

The main dimensions of E3ME are:

- 53 countries – all major world economies, the EU28 and candidate countries plus other countries' economies grouped
- 43 or 69 (Europe) industry sectors, based on standard international classifications
- 28 or 43 (Europe) categories of household expenditure
- 22 different users of 12 different fuel types
- 14 types of air-borne emission (where data are available) including the six greenhouse gases monitored under the Kyoto protocol

A.4 Standard outputs from the model

As a general model of the economy, based on the full structure of the national accounts, E3ME is capable of producing a broad range of economic indicators. In addition there is range of energy and environment indicators. The following list provides a summary of the most common model outputs:

- GDP and the aggregate components of GDP (household expenditure, investment, government expenditure and international trade)
- sectoral output and GVA, prices, trade and competitiveness effects
- international trade by sector, origin and destination
- consumer prices and expenditures
- sectoral employment, unemployment, sectoral wage rates and labour supply
- energy demand, by sector and by fuel, energy prices
- CO_2 emissions by sector and by fuel
- other air-borne emissions
- material demands (Europe only at present)

This list is by no means exhaustive and the delivered outputs often depend on the requirements of the specific application. In addition to the sectoral dimension mentioned in the list, all indicators are produced at the national and regional level and annually over the period up to 2050.

A.5 E3ME as an E3 model

The E3 interactions

Figure A.1 shows how the three components (modules) of the model - energy, environment and economy - fit together. Each component is shown in its own box. Each data set has been constructed by statistical offices to conform with accounting conventions. Exogenous factors coming from outside the modelling framework are shown on the outside edge of the chart as inputs into each component. For each region's economy the exogenous factors are economic policies (including tax rates, growth in government expenditures, interest rates and exchange rates). For the energy system, the outside factors are the world oil prices and energy policy (including regulation of the energy industries). For the environment component, exogenous factors include policies such as reduction in SO_2 emissions by means of end-of-pipe filters from large combustion plants. The linkages between the components of the model are shown explicitly by the arrows that indicate which values are transmitted between components.

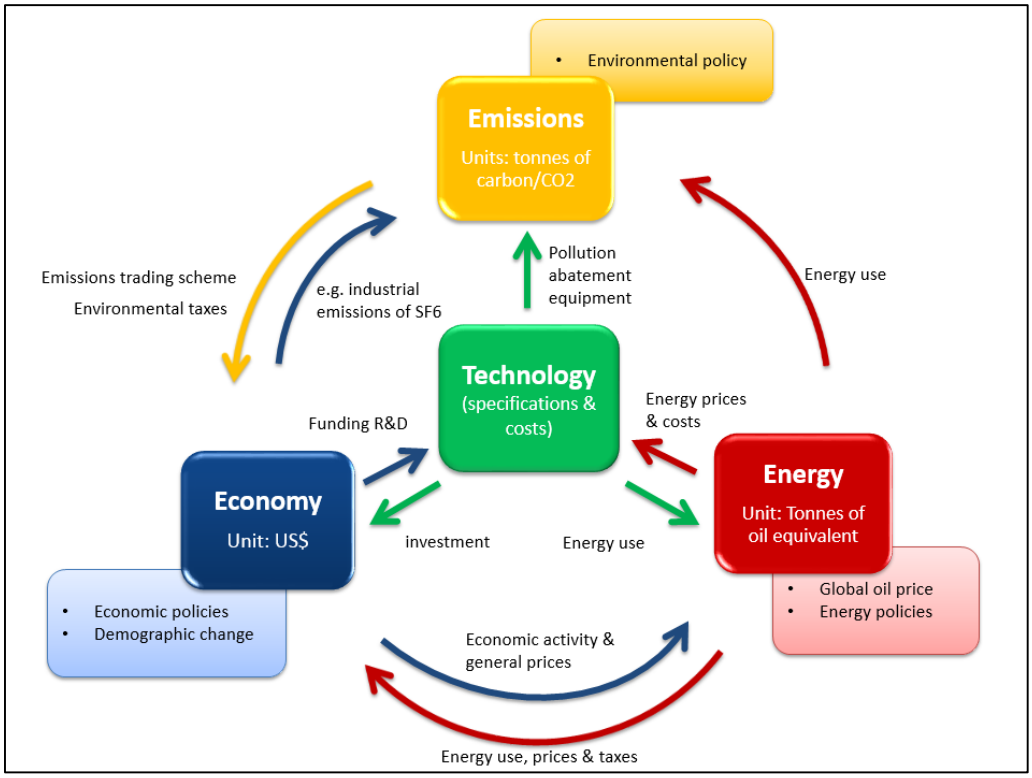
The economy module provides measures of economic activity and general price levels to the energy module; the energy module provides measures of emissions of the main air pollutants to the environment module, which in turn can give measures of damage to health and buildings. The energy module provides detailed price levels for energy carriers distinguished in the economy module and the overall price of energy as well as energy use in the economy.

The role of technology

Technological progress plays an important role in the E3ME model, affecting all three Es: economy, energy and environment. The model's endogenous technical progress indicators (TPIs), a function of R&D and gross investment, appear in nine of E3ME's econometric equation sets including trade, the labour market and prices. Investment and R&D in new technologies also appears in the E3ME's energy and material demand equations to capture energy/resource savings technologies as well as pollution abatement equipment. In addition, E3ME also captures low carbon technologies in the power sector through the FTT power sector model[2].

[2] See Mercure, J-F (2012), 'FTT:Power A global model of the power sector with induced technological change and natural resource depletion', Energy Policy, 48, 799–811.

Figure A.6.1: E3 linkages in the E3ME model



A.6 Treatment of international trade

An important part of the modelling concerns international trade. E3ME solves for detailed bilateral trade between regions (similar to a two-tier Armington model). Trade is modelled in three stages:

- econometric estimation of regions' sectoral import demand
- econometric estimation of regions' bilateral imports from each partner
- forming exports from other regions' import demands

Trade volumes are determined by a combination of economic activity indicators, relative prices and technology.

A.7 The labour market

Treatment of the labour market is an area that distinguishes E3ME from other macroeconomic models. E3ME includes econometric equation sets for employment, average working hours, wage rates and participation rates. The first three of these are disaggregated by economic sector while participation rates are disaggregated by gender and five-year age band.

The labour force is determined by multiplying labour market participation rates by population. Unemployment (including both voluntary and involuntary unemployment) is determined by taking the difference between the labour force and employment. This is typically a key variable of interest for policy makers.

A.8 Comparison with CGE models and econometric specification

E3ME is often compared to Computable General Equilibrium (CGE) models. In many ways the modelling approaches are similar; they are used to answer similar questions and use similar inputs and outputs. However, underlying this there are important theoretical differences between the modelling approaches.

In a typical CGE framework, optimal behaviour is assumed, output is determined by supply-side constraints and prices adjust fully so that all the available capacity is used. In E3ME the determination of output comes from a post-Keynesian framework and it is possible to have spare capacity. The model is more demand-driven and it is not assumed that prices always adjust to market clearing levels.

The differences have important practical implications, as they mean that in E3ME regulation and other policy may lead to increases in output if they are able to draw upon spare economic capacity. This is described in more detail in the model manual.

The econometric specification of E3ME gives the model a strong empirical grounding. E3ME uses a system of error correction, allowing short-term dynamic (or transition) outcomes, moving towards a long-term trend. The dynamic specification is important when considering short and medium-term analysis (e.g. up to 2020) and rebound effects[3], which are included as standard in the model's results.

A.9 Key strengths of E3ME

In summary the key strengths of E3ME are:

- the close integration of the economy, energy systems and the environment, with two-way linkages between each component
- the detailed sectoral disaggregation in the model's classifications, allowing for the analysis of similarly detailed scenarios
- its global coverage, while still allowing for analysis at the national level for large economies
- the econometric approach, which provides a strong empirical basis for the model and means it is not reliant on some of the restrictive assumptions common to CGE models
- the econometric specification of the model, making it suitable for short and medium-term assessment, as well as longer-term trends

[3] Where an initial increase in efficiency reduces demand, but this is negated in the long run as greater efficiency lowers the relative cost and increases consumption. See Barker, T S, S De-Ramon and H Pollitt (2009), 'Revenue recycling and labour markets: effects on costs of policies for sustainability', in (eds) V. Bosetti, R. Gerlagh and S. Schleicher, Modelling Transitions to Sustainable Development, Elgar, Cheltenham, UK.

Appendix B The Models' Coverages

	E3ME	TIAM	E3ME-Proxy	POLES	E3ME- Proxy
1	Belgium	Africa	53	World	
2	Denmark	Australia	37-38	France	6
3	Germany	Canada	36	Germany	3
4	Greece	China	41	Italy	8
5	Spain	Other Latin America	47	United Kingdom	15
6	France	Eastern Europe	16-27,31-33	European Union (28)	1-2,4-5,7,9-14,16-27,31,33
7	Ireland	Former Soviet Union	39-40	Turkey	32
8	Italy	India	42	United States	34
9	Luxembourg	Japan	35	Canada	36
10	Netherlands	Middle East	52	Mexico	43
11	Austria	Mexico	43	Japan	35
12	Portugal	Other Developing Asia	49-51	South Korea	48-49,51
13	Finland	South Korea	48	Russia	39-40
14	Sweden	USA	34	China	41
15	UK	Western Europe	1-15,28-30	India	42
16	Czech Republic	Argentina	45	Indonesia	50
17	Estonia	Brazil	44	Brazil	44
18	Cyprus	Colombia	46	South Africa	53
19	Latvia	Chile	47	Pacific (Australia-NZ-Pacific Islands)	37-38
20	Lithuania	Venezuela	47	Rest of South America (excl.Brazil)	45-47
21	Hungary	World		Gulf countries	52
22	Malta				
23	Poland				
24	Slovenia				
25	Slovakia				
26	Bulgaria				
27	Romania				
28	Norway				
29	Switzerland				
30	Iceland				
31	Croatia				
32	Turkey				
33	Macedonia				
34	USA				
35	Japan				
36	Canada				
37	Australia				
38	New Zealand				
39	Russian Federation				

	E3ME	TIAM	E3ME-Proxy	POLES	E3ME- Proxy
40	Rest of Annex I				
41	China				
42	India				
43	Mexico				
44	Brazil				
45	Argentina				
46	Colombia				
47	Rest of Latin America				
48	Korea				
49	Taiwan				
50	Indonesia				
51	Rest of ASEAN				
52	OPEC excl Venezuela				
53	Rest of world				

Appendix C Detailed Results

C.1 Introduction

The detailed results in this appendix can be subject to a considerable range of uncertainty. Please contact the authors for further information about these figures.

C.2 Manufacturing output in 2030

European Union output at basic prices, % difference to baseline

	TIAM-ECN_CT40	TIAM-ECN_CT70	TIAM-ECN_CT100	POLES_ct40	POLES_ct70	POLES_ct100
Food, Drink & Tobacco	0.1	0.3	0.7	0.1	0.2	0.3
Textiles, Clothing & Leather	0.1	0.4	0.7	0.5	0.7	0.9
Wood & Paper	-0.2	0.0	0.4	0.4	0.6	0.8
Printing & Publishing	0.2	0.5	1.0	0.3	0.5	0.6
Manufactured Fuels	-2.7	-4.0	-5.0	-1.1	-1.9	-2.7
Pharmaceuticals	0.3	0.6	1.0	0.4	0.6	0.7
Other Chemicals	0.1	0.4	0.6	0.8	1.0	1.2
Rubber & Plastics	0.1	0.4	0.8	0.9	1.3	1.6
Non-Metallic Mineral Products	0.1	0.3	0.7	0.7	1.1	1.4
Basic Metals	0.1	0.5	1.0	1.1	1.6	2.0
Metal Goods	0.7	1.4	2.4	1.8	2.5	3.1
Mechanical Engineering	0.8	1.7	2.5	1.8	2.5	3.1
Electronics	0.4	1.4	2.2	1.8	2.3	2.8
Electrical Engineering	0.7	1.5	2.0	1.1	1.6	2.0
Motor Vehicles	0.0	0.2	2.0	1.1	1.8	2.4
Other Transport Equipment	-0.1	0.1	0.1	0.3	0.4	0.6
Other Manufacturing	0.3	0.9	1.6	1.1	1.6	2.1
Total Manufacturing	0.2	0.6	1.2	0.9	1.2	1.6

Germany output at basic prices, % difference to baseline

	TIAM-ECN_CT40	TIAM-ECN_CT70	TIAM-ECN_CT100	POLES_ct40	POLES_ct70	POLES_ct100
Food, Drink & Tobacco	-0.1	-0.1	0.1	0.0	0.1	0.2
Textiles, Clothing & Leather	0.1	0.2	0.3	0.1	0.2	0.2
Wood & Paper	-0.4	-0.3	-0.1	0.4	0.5	0.7
Printing & Publishing	-0.2	-0.1	-0.1	0.1	0.1	0.1
Manufactured Fuels	-4.4	-6.6	-8.6	-0.8	-0.9	-1.4
Pharmaceuticals	0.4	0.7	1.0	0.6	0.8	1.0
Other Chemicals	-0.1	0.1	0.1	0.2	0.4	0.5

Rubber & Plastics	0.0	0.1	0.2	0.4	0.6	0.8
Non-Metallic Mineral Products	0.5	0.7	1.1	1.5	2.2	2.9
Basic Metals	-0.2	0.1	0.6	1.1	1.7	2.2
Metal Goods	0.8	1.3	2.2	2.0	3.0	3.5
Mechanical Engineering	0.4	0.7	1.0	0.9	1.2	1.6
Electronics	0.2	0.8	1.2	1.4	1.9	2.4
Electrical Engineering	0.5	0.7	0.8	0.2	0.4	0.7
Motor Vehicles	0.0	-0.1	0.9	0.7	1.1	1.6
Other Transport Equipment	-0.1	-0.6	-1.1	-0.8	-1.3	-1.8
Other Manufacturing	0.2	0.5	1.0	1.1	1.5	1.9
Total Manufacturing	0.1	0.2	0.6	0.7	1.0	1.3

France output at basic prices, % difference to baseline

	TIAM-ECN_CT40	TIAM-ECN_CT70	TIAM-ECN_CT100	POLES_ct40	POLES_ct70	POLES_ct100
Food, Drink & Tobacco	0.2	0.4	0.8	0.2	0.3	0.4
Textiles, Clothing & Leather	1.3	2.4	3.9	2.6	4.0	4.9
Wood & Paper	-0.1	0.1	0.4	0.5	0.7	0.9
Printing & Publishing	1.5	2.3	4.1	1.3	1.9	2.4
Manufactured Fuels	-4.0	-5.3	-6.3	-2.5	-4.0	-5.4
Pharmaceuticals	0.5	0.8	1.6	0.3	0.4	0.6
Other Chemicals	0.7	1.7	2.4	4.5	5.4	6.1
Rubber & Plastics	0.4	0.9	1.3	1.1	1.7	2.0
Non-Metallic Mineral Products	0.1	0.2	0.4	0.4	0.7	0.8
Basic Metals	0.4	0.3	0.5	0.2	0.3	0.4
Metal Goods	0.9	1.7	2.5	1.7	2.4	2.9
Mechanical Engineering	1.5	2.9	4.6	3.5	4.7	5.7
Electronics	0.8	2.1	3.9	2.9	3.9	4.8
Electrical Engineering	1.8	3.5	4.5	2.1	3.4	4.5
Motor Vehicles	0.1	0.2	1.4	0.9	1.3	1.8
Other Transport Equipment	-0.3	0.4	1.0	1.1	1.8	2.4
Other Manufacturing	0.1	0.3	0.7	0.7	1.0	1.4
Total Manufacturing	0.3	0.9	1.6	1.2	1.7	2.1

Italy output at basic prices, % difference to baseline

	TIAM-ECN_CT40	TIAM-ECN_CT70	TIAM-ECN_CT100	POLES_ct40	POLES_ct70	POLES_ct100
Food, Drink & Tobacco	0.8	1.1	2.5	0.3	0.5	0.6
Textiles, Clothing & Leather	0.1	0.2	0.6	0.4	0.6	0.8
Wood & Paper	-0.4	-0.3	0.1	0.3	0.5	0.6
Printing & Publishing	0.1	0.2	0.4	0.3	0.4	0.5
Manufactured Fuels	-2.3	-3.0	-3.7	-0.3	-0.7	-1.1

Pharmaceuticals	0.4	1.2	1.6	0.9	1.4	1.6
Other Chemicals	0.1	0.4	0.8	0.6	0.8	1.0
Rubber & Plastics	0.0	0.1	0.3	0.4	0.5	0.6
Non-Metallic Mineral Products	0.2	0.3	0.7	0.5	0.7	0.9
Basic Metals	-0.1	0.2	0.6	1.0	1.4	1.8
Metal Goods	0.7	1.4	2.7	1.5	2.2	2.7
Mechanical Engineering	0.3	0.7	1.4	0.8	1.1	1.4
Electronics	0.0	0.2	0.5	0.5	0.5	0.7
Electrical Engineering	0.5	1.2	1.7	1.1	1.5	1.8
Motor Vehicles	0.6	2.1	7.2	2.0	3.2	4.3
Other Transport Equipment	0.2	1.0	1.9	0.7	1.1	1.5
Other Manufacturing	0.1	0.4	0.9	0.3	0.4	0.6
Total Manufacturing	0.2	0.6	1.4	0.7	1.0	1.2

United Kingdom output at basic prices, % difference to baseline

	TIAM-ECN_CT40	TIAM-ECN_CT70	TIAM-ECN_CT100	POLES_ct40	POLES_ct70	POLES_ct100
Food, Drink & Tobacco	0.0	0.2	0.6	0.1	0.2	0.3
Textiles, Clothing & Leather	0.5	0.6	0.0	0.8	1.4	1.8
Wood & Paper	-0.3	0.0	1.0	0.5	0.6	0.8
Printing & Publishing	1.0	1.4	3.4	0.3	0.4	0.5
Manufactured Fuels	-8.2	-12.9	-14.6	-3.1	-6.1	-8.7
Pharmaceuticals	0.4	1.5	4.0	0.2	0.7	1.0
Other Chemicals	0.0	0.0	0.0	0.1	0.2	0.2
Rubber & Plastics	-0.1	0.1	0.7	0.6	0.8	1.0
Non-Metallic Mineral Products	-0.2	-0.1	0.1	0.2	0.3	0.4
Basic Metals	-0.1	0.0	0.1	0.2	0.2	0.2
Metal Goods	0.0	0.1	0.5	0.6	0.8	1.0
Mechanical Engineering	0.8	1.4	1.9	1.4	1.9	2.3
Electronics	-0.1	0.8	2.4	3.1	3.8	4.4
Electrical Engineering	-2.5	-3.0	-4.1	-2.4	-3.0	-3.5
Motor Vehicles	-0.4	-0.3	4.2	1.5	2.4	3.2
Other Transport Equipment	-0.3	-0.7	-2.3	-0.9	-1.6	-2.2
Other Manufacturing	0.3	1.0	2.4	1.2	1.7	2.1
Total Manufacturing	-0.2	-0.1	0.6	0.4	0.5	0.5

Turkey output at basic prices, % difference to baseline

	TIAM-ECN_CT40	TIAM-ECN_CT70	TIAM-ECN_CT100	POLES_ct40	POLES_ct70	POLES_ct100
Food, Drink & Tobacco	0.2	0.4	0.6	0.2	0.5	0.7
Textiles, Clothing & Leather	0.8	1.5	1.8	2.5	4.1	5.0
Wood & Paper	0.3	0.5	0.7	0.5	0.8	1.2

Printing & Publishing	0.2	0.2	0.3	0.2	0.4	0.6
Manufactured Fuels	-1.6	-2.5	-3.6	-0.3	-0.7	-1.3
Pharmaceuticals	0.9	1.8	2.7	2.2	3.6	5.0
Other Chemicals	0.0	0.0	0.0	0.0	0.0	0.0
Rubber & Plastics	0.1	0.2	0.5	0.6	0.9	1.2
Non-Metallic Mineral Products	0.4	0.5	0.8	0.8	1.4	1.9
Basic Metals	0.2	0.5	1.0	1.3	1.9	2.5
Metal Goods	0.5	0.6	1.5	2.4	3.8	5.0
Mechanical Engineering	0.0	0.0	0.0	0.0	0.0	0.0
Electronics	0.2	0.3	0.6	0.6	1.0	1.4
Electrical Engineering	0.0	0.0	0.0	0.0	0.0	0.0
Motor Vehicles	0.1	0.0	0.2	0.1	0.2	0.3
Other Transport Equipment	1.4	0.6	1.3	0.1	0.2	0.2
Other Manufacturing	0.1	0.2	0.4	0.2	0.3	0.4
Total Manufacturing	0.3	0.3	0.6	0.7	1.2	1.5

United States output at basic prices, % difference to baseline

	TIAM-ECN_CT40	TIAM-ECN_CT70	TIAM-ECN_CT100	POLES_ct40	POLES_ct70	POLES_ct100
Food, Drink & Tobacco	-0.5	-0.9	-0.9	0.0	0.1	0.2
Textiles, Clothing & Leather	-0.3	-1.2	-1.2	0.6	1.0	1.2
Wood & Paper	-0.1	-0.3	-0.3	0.2	0.3	0.3
Printing & Publishing	0.4	0.4	0.4	0.5	0.7	0.9
Manufactured Fuels	-1.1	-2.4	-3.7	-0.5	-1.2	-2.0
Pharmaceuticals	-0.2	-0.3	-0.3	-0.2	-0.2	-0.2
Other Chemicals	0.1	-0.1	-0.1	0.7	1.0	1.2
Rubber & Plastics	1.1	1.0	1.1	0.7	0.9	1.2
Non-Metallic Mineral Products	0.2	0.1	0.0	0.3	0.5	0.6
Basic Metals	4.4	4.2	5.1	3.1	4.9	6.4
Metal Goods	4.3	4.6	5.0	1.4	2.1	2.5
Mechanical Engineering	5.9	5.8	6.3	1.8	2.6	3.2
Electronics	2.7	3.2	3.6	1.9	3.0	3.9
Electrical Engineering	1.5	1.7	1.8	0.6	0.9	1.1
Motor Vehicles	0.2	-0.6	0.0	2.2	3.6	4.8
Other Transport Equipment	0.3	1.2	1.2	0.3	0.4	0.4
Other Manufacturing	0.3	0.3	0.4	0.3	0.5	0.6
Total Manufacturing	0.7	0.5	0.4	0.7	1.0	1.2

Japan output at basic prices, % difference to baseline

	TIAM-ECN_CT40	TIAM-ECN_CT70	TIAM-ECN_CT100	POLES_ct40	POLES_ct70	POLES_ct100
Food, Drink & Tobacco	-0.4	-0.9	-1.0	-0.1	-0.1	-0.1

Textiles, Clothing & Leather	-0.2	-0.4	-0.4	0.0	0.0	0.0
Wood & Paper	-0.2	-0.5	-0.5	0.4	0.6	0.9
Printing & Publishing	-0.4	-0.7	-0.8	0.2	0.4	0.6
Manufactured Fuels	-4.9	-5.4	-6.7	-3.5	-4.8	-6.6
Pharmaceuticals	0.3	0.4	0.5	0.4	0.6	0.8
Other Chemicals	0.3	0.6	0.7	0.4	0.6	0.8
Rubber & Plastics	0.1	0.1	0.1	0.3	0.5	0.7
Non-Metallic Mineral Products	0.2	0.2	0.2	0.2	0.3	0.5
Basic Metals	0.2	0.2	0.5	0.8	1.6	2.3
Metal Goods	0.4	1.2	1.7	0.9	2.0	3.1
Mechanical Engineering	1.5	2.8	3.5	1.5	2.8	3.9
Electronics	0.5	0.9	1.2	1.1	2.0	2.9
Electrical Engineering	0.6	1.3	1.7	1.2	2.3	3.1
Motor Vehicles	0.9	-1.0	-0.7	2.4	4.1	5.8
Other Transport Equipment	0.1	0.0	0.1	0.2	0.4	0.5
Other Manufacturing	-0.1	-0.2	-0.1	0.0	0.1	0.1
Total Manufacturing	0.1	0.0	0.1	0.6	1.1	1.5

Canada output at basic prices, % difference to baseline

	TIAM-ECN_CT40	TIAM-ECN_CT70	TIAM-ECN_CT100	POLES_ct40	POLES_ct70	POLES_ct100
Food, Drink & Tobacco	-0.1	0.1	0.0	0.0	0.1	0.1
Textiles, Clothing & Leather	-0.3	1.1	0.4	1.1	2.5	2.7
Wood & Paper	0.0	0.1	0.1	0.2	0.3	0.3
Printing & Publishing	0.0	0.5	0.4	0.4	0.5	0.7
Manufactured Fuels	-3.4	-10.0	-10.3	-2.3	-4.0	-5.7
Pharmaceuticals	-0.3	-0.3	-0.3	-0.2	-0.3	-0.3
Other Chemicals	0.2	1.1	0.8	0.6	1.0	1.2
Rubber & Plastics	0.6	1.3	1.1	0.9	1.3	1.5
Non-Metallic Mineral Products	-0.1	0.3	0.1	0.2	0.4	0.5
Basic Metals	0.9	2.3	2.6	1.0	1.5	2.3
Metal Goods	3.0	3.9	4.8	1.6	2.4	2.9
Mechanical Engineering	1.3	1.8	2.1	1.1	1.5	1.8
Electronics	0.9	1.9	2.0	1.9	2.8	3.7
Electrical Engineering	-0.5	-0.3	-0.2	-0.4	-0.5	-0.5
Motor Vehicles	1.1	10.3	10.5	2.2	3.5	4.9
Other Transport Equipment	0.8	3.8	3.4	0.8	1.2	1.5
Other Manufacturing	0.4	1.2	1.3	0.8	1.2	1.6
Total Manufacturing	0.3	1.5	1.6	0.6	1.0	1.2

Australia output at basic prices, % difference to baseline

	TIAM-ECN_CT40	TIAM-ECN_CT70	TIAM-ECN	POLES_ct40	POLES_ct70	POLES_ct100

			_CT100			
Food, Drink & Tobacco	0.5	0.7	0.7	0.3	0.4	0.5
Textiles, Clothing & Leather	0.0	0.0	0.0	0.0	0.0	0.0
Wood & Paper	-0.1	0.1	0.1	0.6	0.9	1.0
Printing & Publishing	0.3	0.5	0.5	0.3	0.5	0.5
Manufactured Fuels	-4.9	-7.8	-13.4	-2.0	-4.5	-6.6
Pharmaceuticals	0.2	0.3	0.3	0.1	0.2	0.2
Other Chemicals	1.2	2.1	2.1	0.7	1.1	1.2
Rubber & Plastics	3.6	5.3	5.5	1.2	1.9	2.0
Non-Metallic Mineral Products	0.3	0.3	0.3	0.3	0.5	0.6
Basic Metals	0.7	1.1	1.2	0.3	0.4	0.5
Metal Goods	5.6	8.9	10.1	2.3	3.6	4.1
Mechanical Engineering	13.4	20.2	21.8	4.4	6.7	7.5
Electronics	10.3	17.3	20.8	6.5	10.3	12.7
Electrical Engineering	5.0	7.4	7.9	1.8	2.7	3.0
Motor Vehicles	0.0	0.0	0.0	0.0	0.0	0.0
Other Transport Equipment	-0.2	-1.2	-1.3	-0.2	-0.3	-0.4
Other Manufacturing	0.9	1.2	1.3	0.8	1.3	1.6
Total Manufacturing	1.7	2.5	2.6	0.7	1.1	1.1

Russia output at basic prices, % difference to baseline

	TIAM-ECN _CT40	TIAM-ECN _CT70	TIAM-ECN _CT100	POLES _ct40	POLES _ct70	POLES _ct100
Food, Drink & Tobacco	-0.1	0.0	0.2	0.2	0.3	0.4
Textiles, Clothing & Leather	0.0	0.0	0.0	0.0	0.0	0.0
Wood & Paper	-0.3	-0.6	-0.8	-0.2	-0.3	-0.4
Printing & Publishing	-0.2	-0.2	-0.2	0.1	0.1	0.2
Manufactured Fuels	0.0	0.0	0.0	0.0	0.0	0.0
Pharmaceuticals	0.2	0.2	0.2	-0.1	-0.1	-0.1
Other Chemicals	-1.5	-2.1	-2.8	-1.8	-2.6	-3.3
Rubber & Plastics	-0.2	0.1	0.3	0.2	0.3	0.4
Non-Metallic Mineral Products	-0.8	-1.1	-1.6	0.4	0.6	0.9
Basic Metals	-0.8	-0.1	0.4	0.5	0.8	1.0
Metal Goods	-0.7	0.1	0.7	0.8	1.1	1.4
Mechanical Engineering	-3.4	0.2	3.0	3.1	4.5	5.5
Electronics	-3.0	-0.4	-0.1	3.7	5.5	7.2
Electrical Engineering	-0.5	-0.1	0.3	0.5	0.7	0.8
Motor Vehicles	-1.3	-1.5	-4.0	0.0	0.1	0.3
Other Transport Equipment	-0.7	-0.4	-1.2	0.4	0.7	0.9
Other Manufacturing	-0.3	0.4	0.6	0.8	1.2	1.6
Total Manufacturing	-0.5	-0.1	0.1	0.4	0.6	0.8

China output at basic prices, % difference to baseline

	TIAM-ECN_CT40	TIAM-ECN_CT70	TIAM-ECN_CT100	POLES_ct40	POLES_ct70	POLES_ct100
Food, Drink & Tobacco	0.2	0.8	0.9	0.4	0.6	0.6
Textiles, Clothing & Leather	0.1	0.3	0.4	0.2	0.3	0.3
Wood & Paper	0.8	3.3	3.3	2.7	4.1	4.5
Printing & Publishing	0.2	1.0	1.1	0.9	1.4	1.4
Manufactured Fuels	0.0	0.0	0.0	0.0	0.0	0.0
Pharmaceuticals	0.2	0.6	0.8	0.6	1.0	1.1
Other Chemicals	0.0	0.2	0.4	0.6	0.9	1.0
Rubber & Plastics	0.4	1.2	1.4	0.9	1.4	1.4
Non-Metallic Mineral Products	0.0	0.4	0.4	0.6	1.0	1.1
Basic Metals	0.2	0.7	0.7	0.6	0.8	0.9
Metal Goods	5.4	14.9	16.2	10.1	15.2	15.6
Mechanical Engineering	2.7	6.9	7.5	4.6	6.8	6.9
Electronics	-0.1	0.4	0.5	0.7	1.2	1.3
Electrical Engineering	-0.1	0.8	1.0	1.1	1.7	1.8
Motor Vehicles	-4.2	-3.5	-3.4	2.8	4.5	5.4
Other Transport Equipment	-0.2	0.1	0.2	0.2	0.4	0.4
Other Manufacturing	1.4	4.9	4.7	2.9	4.4	4.9
Total Manufacturing	0.2	1.0	1.1	0.9	1.3	1.4

India output at basic prices, % difference to baseline

	TIAM-ECN_CT40	TIAM-ECN_CT70	TIAM-ECN_CT100	POLES_ct40	POLES_ct70	POLES_ct100
Food, Drink & Tobacco	-0.3	-0.4	-0.4	-0.3	-0.1	0.1
Textiles, Clothing & Leather	0.1	0.2	0.3	-0.1	0.0	0.1
Wood & Paper	0.2	0.3	0.1	-0.4	-0.5	-0.5
Printing & Publishing	-0.1	0.1	0.1	-0.1	0.1	0.2
Manufactured Fuels	0.0	0.0	0.0	0.0	0.0	0.0
Pharmaceuticals	0.1	0.3	0.3	0.1	0.3	0.3
Other Chemicals	0.0	0.2	0.3	0.0	0.2	0.3
Rubber & Plastics	0.1	0.2	0.3	0.1	0.3	0.3
Non-Metallic Mineral Products	1.8	1.9	1.8	0.4	0.5	0.6
Basic Metals	0.0	0.1	0.2	0.1	0.2	0.2
Metal Goods	0.4	1.3	1.5	0.5	1.0	1.0
Mechanical Engineering	1.5	13.7	18.0	8.2	17.1	16.8
Electronics	1.5	2.6	2.8	0.4	1.1	1.2
Electrical Engineering	-4.9	14.8	21.5	19.4	39.4	39.4
Motor Vehicles	2.0	-1.1	-0.9	1.2	2.7	3.3
Other Transport Equipment	0.3	0.1	0.1	0.0	0.2	0.2
Other Manufacturing	0.0	0.0	-0.1	0.0	0.1	0.1
Total Manufacturing	0.2	0.9	1.1	0.4	0.9	0.9

Brazil output at basic prices, % difference to baseline

	TIAM-ECN_CT40	TIAM-ECN_CT70	TIAM-ECN_CT100	POLES_ct40	POLES_ct70	POLES_ct100
Food, Drink & Tobacco	0.0	0.5	0.5	0.0	0.3	0.5
Textiles, Clothing & Leather	-0.1	0.3	0.3	0.1	0.4	0.7
Wood & Paper	0.1	1.0	1.2	0.4	0.8	1.2
Printing & Publishing	0.0	0.5	0.6	0.2	0.4	0.6
Manufactured Fuels	-0.2	-6.7	-7.0	-3.1	-4.8	-6.5
Pharmaceuticals	0.4	1.0	1.2	0.3	0.5	0.7
Other Chemicals	0.2	1.1	1.4	0.2	0.6	0.8
Rubber & Plastics	0.3	2.2	3.0	0.6	1.2	1.6
Non-Metallic Mineral Products	0.0	0.6	0.8	0.7	1.0	1.4
Basic Metals	0.6	2.5	3.5	0.7	1.1	1.5
Metal Goods	2.4	11.2	15.4	2.2	3.5	4.7
Mechanical Engineering	3.9	15.8	21.5	3.3	4.8	6.2
Electronics	0.0	0.0	0.0	0.0	0.0	0.0
Electrical Engineering	0.4	2.3	3.2	0.3	0.5	0.7
Motor Vehicles	0.1	-0.4	-0.4	0.8	1.4	1.9
Other Transport Equipment	0.1	0.6	0.6	0.6	0.9	1.2
Other Manufacturing	0.0	0.5	0.6	0.2	0.5	0.7
Total Manufacturing	0.3	1.2	1.7	0.3	0.5	0.7

Mexico output at basic prices, % difference to baseline

	TIAM-ECN_CT40	TIAM-ECN_CT70	TIAM-ECN_CT100	POLES_ct40	POLES_ct70	POLES_ct100
Food, Drink & Tobacco	-0.1	-0.3	-0.3	0.0	0.0	0.0
Textiles, Clothing & Leather	-0.3	-1.2	-1.4	0.6	1.1	1.3
Wood & Paper	0.0	0.0	0.0	0.1	0.2	0.3
Printing & Publishing	-0.9	-4.3	-5.1	0.7	1.0	1.2
Manufactured Fuels	-0.8	-2.0	-2.3	-1.6	-2.5	-3.7
Pharmaceuticals	-0.1	-0.4	-0.5	0.0	0.0	0.0
Other Chemicals	-0.7	-2.4	-2.9	0.1	0.2	0.2
Rubber & Plastics	1.1	-3.2	-3.6	1.9	2.9	3.6
Non-Metallic Mineral Products	0.6	0.3	0.2	0.5	0.9	1.3
Basic Metals	0.3	-0.1	-0.1	0.5	0.7	0.9
Metal Goods	7.3	5.4	7.1	4.0	6.2	8.0
Mechanical Engineering	2.8	1.5	1.8	1.5	2.4	2.9
Electronics	0.7	-0.2	0.0	1.2	1.9	2.5
Electrical Engineering	0.0	0.0	0.0	0.0	0.0	0.0
Motor Vehicles	0.3	-1.3	-1.2	0.6	0.9	1.3
Other Transport Equipment	-0.3	-8.2	-8.6	1.8	2.9	3.8
Other Manufacturing	0.5	-0.3	-0.3	0.9	1.3	1.7

Total Manufacturing	0.3	-0.7	-0.7	0.5	0.8	1.0

Argentina output at basic prices, % difference to baseline

	TIAM-ECN_CT40	TIAM-ECN_CT70	TIAM-ECN_CT100	POLES_ct40	POLES_ct70	POLES_ct100
Food, Drink & Tobacco	-0.2	-0.2	-0.2	-0.1	0.0	0.0
Textiles, Clothing & Leather	-0.3	-0.3	-0.3	0.3	0.5	0.6
Wood & Paper	-0.3	-0.3	-0.3	0.3	0.5	0.7
Printing & Publishing	-0.1	0.0	0.0	0.2	0.4	0.5
Manufactured Fuels	-0.8	-7.7	-8.7	-3.7	-6.8	-9.9
Pharmaceuticals	0.0	0.0	0.1	0.1	0.2	0.3
Other Chemicals	-0.2	-0.3	-0.3	0.1	0.1	0.2
Rubber & Plastics	-0.3	0.1	0.7	0.6	1.0	1.3
Non-Metallic Mineral Products	-0.5	-0.6	-0.6	0.6	1.0	1.4
Basic Metals	-0.2	-0.1	0.2	0.8	1.3	1.8
Metal Goods	-0.4	0.4	2.5	2.0	3.0	3.9
Mechanical Engineering	-1.8	0.1	5.4	4.6	7.0	9.1
Electronics	-1.4	3.7	6.2	7.3	11.5	15.4
Electrical Engineering	-2.8	3.1	19.8	12.8	20.0	26.7
Motor Vehicles	-0.9	-5.5	-5.6	6.3	10.2	13.7
Other Transport Equipment	-0.6	-2.3	-2.3	2.6	4.2	5.7
Other Manufacturing	-0.2	-0.1	0.0	0.3	0.5	0.7
Total Manufacturing	-0.4	-1.2	-1.0	0.3	0.4	0.5

Republic of Korea output at basic prices, % difference to baseline

	TIAM-ECN_CT40	TIAM-ECN_CT70	TIAM-ECN_CT100	POLES_ct40	POLES_ct70	POLES_ct100
Food, Drink & Tobacco	-0.1	0.0	0.1	0.0	0.0	0.0
Textiles, Clothing & Leather	0.0	0.1	0.2	0.0	0.1	0.1
Wood & Paper	0.2	0.4	1.4	0.3	0.5	0.6
Printing & Publishing	0.0	0.3	1.2	0.3	0.3	0.4
Manufactured Fuels	-1.1	-2.8	-3.9	-2.2	-3.0	-3.8
Pharmaceuticals	0.2	0.2	0.5	0.1	0.2	0.3
Other Chemicals	0.1	0.4	1.5	0.3	0.5	0.6
Rubber & Plastics	0.2	0.7	2.9	0.7	1.0	1.2
Non-Metallic Mineral Products	0.3	0.7	1.7	0.5	0.7	1.0
Basic Metals	0.5	1.4	3.0	1.1	1.6	1.9
Metal Goods	1.9	5.1	9.8	2.9	4.3	4.7
Mechanical Engineering	0.4	1.5	5.6	0.7	1.0	1.1
Electronics	0.0	0.1	0.3	0.1	0.2	0.2
Electrical Engineering	0.2	0.9	3.8	0.8	1.1	1.4
Motor Vehicles	-0.1	-0.3	0.4	0.8	1.3	1.6

Other Transport Equipment	0.1	0.1	0.3	0.1	0.1	0.1
Other Manufacturing	0.0	0.0	0.3	0.2	0.2	0.3
Total Manufacturing	0.1	0.4	1.4	0.3	0.5	0.6

Indonesia output at basic prices, % difference to baseline

	TIAM-ECN_CT40	TIAM-ECN_CT70	TIAM-ECN_CT100	POLES_ct40	POLES_ct70	POLES_ct100
Food, Drink & Tobacco	0.6	1.0	1.7	-1.8	-0.8	0.0
Textiles, Clothing & Leather	-0.3	-0.2	-0.1	-1.2	-0.8	-0.5
Wood & Paper	0.0	0.2	0.2	-0.1	0.0	0.0
Printing & Publishing	-0.2	0.0	0.0	-0.4	-0.2	-0.1
Manufactured Fuels	0.0	0.0	0.0	0.0	0.0	0.0
Pharmaceuticals	-0.1	0.0	0.0	-0.4	-0.3	-0.1
Other Chemicals	0.0	0.2	0.4	-0.2	0.1	0.4
Rubber & Plastics	-0.1	0.2	0.2	0.0	0.0	0.0
Non-Metallic Mineral Products	-0.3	-0.4	-0.5	0.3	0.6	0.8
Basic Metals	2.5	8.4	15.3	6.4	10.4	13.4
Metal Goods	1.0	5.1	8.3	2.6	4.0	5.0
Mechanical Engineering	4.8	20.9	34.1	11.3	16.3	19.8
Electronics	0.1	0.4	0.9	0.6	1.1	1.5
Electrical Engineering	0.9	3.5	5.7	1.4	2.3	3.1
Motor Vehicles	0.3	-0.2	0.3	0.2	0.5	0.8
Other Transport Equipment	0.5	1.1	1.5	0.3	0.6	0.9
Other Manufacturing	0.3	1.0	2.5	0.3	1.7	3.0
Total Manufacturing	0.4	1.1	2.0	0.1	0.7	1.3

Proxy for Saudi Arabia (OPEC) output at basic prices, % difference to baseline

	TIAM-ECN_CT40	TIAM-ECN_CT70	TIAM-ECN_CT100	POLES_ct40	POLES_ct70	POLES_ct100
Food, Drink & Tobacco	-4.2	-6.3	-7.2	-1.3	-1.4	-1.3
Textiles, Clothing & Leather	-0.5	-0.7	-0.8	0.4	0.7	0.8
Wood & Paper	-0.8	-1.0	-1.3	1.7	2.7	3.8
Printing & Publishing	-0.3	-0.4	-0.4	0.4	0.6	0.6
Manufactured Fuels	0.0	0.0	0.0	0.0	0.0	0.0
Pharmaceuticals	-0.2	-0.3	-0.3	0.3	0.5	0.5
Other Chemicals	-0.1	-0.2	-0.2	0.2	0.3	0.4
Rubber & Plastics	-0.7	-0.6	-0.7	1.1	1.7	2.1
Non-Metallic Mineral Products	-0.3	-0.4	-0.5	0.4	0.8	1.2
Basic Metals	0.0	0.3	0.4	0.8	1.2	1.5
Metal Goods	-0.2	1.3	1.5	1.7	2.7	3.7
Mechanical Engineering	0.4	1.2	1.5	0.9	1.2	1.4

Electronics	-0.4	0.2	0.2	1.8	2.8	3.6
Electrical Engineering	-0.9	2.3	2.3	7.5	11.7	14.9
Motor Vehicles	-0.3	-2.3	-2.1	1.0	1.6	1.9
Other Transport Equipment	-0.7	-3.7	-3.2	2.4	3.8	4.6
Other Manufacturing	-0.5	-0.7	-0.5	0.9	1.3	1.7
Total Manufacturing	-0.6	-0.9	-0.9	0.7	1.1	1.5

Proxy for South Africa (RoW) output at basic prices, % difference to baseline

	TIAM-ECN_CT40	TIAM-ECN_CT70	TIAM-ECN_CT100	POLES_ct40	POLES_ct70	POLES_ct100
Food, Drink & Tobacco	-2.3	-3.6	-4.2	-1.2	-1.4	-1.4
Textiles, Clothing & Leather	0.0	-0.2	-0.2	0.1	0.2	0.3
Wood & Paper	-0.1	0.3	0.9	1.7	2.4	3.0
Printing & Publishing	-0.3	-0.7	-0.9	-0.1	-0.2	-0.2
Manufactured Fuels	-5.4	-9.7	-11.6	-0.1	-2.6	-5.3
Pharmaceuticals	0.2	0.2	0.4	0.3	0.4	0.5
Other Chemicals	-1.5	-4.2	-4.5	1.1	2.6	3.9
Rubber & Plastics	0.2	-0.7	-0.7	0.3	0.5	0.6
Non-Metallic Mineral Products	-0.8	-3.3	-5.2	-1.2	-1.6	-1.7
Basic Metals	-0.1	0.3	0.5	1.0	1.6	2.1
Metal Goods	0.0	0.0	0.0	0.0	0.0	0.0
Mechanical Engineering	0.6	1.0	1.9	1.3	2.2	2.2
Electronics	0.3	0.3	0.6	0.7	1.3	1.5
Electrical Engineering	0.0	0.0	0.0	0.0	0.0	0.0
Motor Vehicles	0.1	1.7	1.6	0.0	-0.2	-0.3
Other Transport Equipment	0.0	-1.2	-0.8	0.4	0.8	1.1
Other Manufacturing	0.0	-0.2	-0.2	0.0	0.0	0.0
Total Manufacturing	-1.5	-2.4	-2.9	-0.3	-0.5	-0.8

World output at basic prices, % difference to baseline

	TIAM-ECN_CT40	TIAM-ECN_CT70	TIAM-ECN_CT100	POLES_ct40	POLES_ct70	POLES_ct100
Food, Drink & Tobacco	-0.3	-0.3	-0.3	0.0	0.0	0.1
Textiles, Clothing & Leather	0.0	0.2	0.2	0.2	0.3	0.4
Wood & Paper	0.0	0.3	0.5	0.6	1.0	1.2
Printing & Publishing	0.1	0.4	0.5	0.5	0.8	0.9
Manufactured Fuels	-1.4	-2.7	-3.5	-0.8	-1.5	-2.2
Pharmaceuticals	0.2	0.5	0.6	0.3	0.5	0.7
Other Chemicals	0.0	0.2	0.3	0.4	0.7	0.8
Rubber & Plastics	0.4	0.8	1.0	0.7	1.1	1.2
Non-Metallic Mineral Products	0.1	0.3	0.3	0.5	0.8	1.0
Basic Metals	0.4	0.9	1.2	0.7	1.1	1.3

Metal Goods	1.6	3.2	4.1	2.1	3.2	3.7
Mechanical Engineering	1.8	4.0	5.0	2.4	3.6	3.9
Electronics	0.4	0.9	1.1	0.9	1.3	1.6
Electrical Engineering	0.3	1.2	1.6	1.1	1.7	1.9
Motor Vehicles	0.0	-0.6	0.0	1.4	2.2	3.0
Other Transport Equipment	0.0	0.3	0.4	0.3	0.4	0.5
Other Manufacturing	0.2	0.5	0.8	0.6	1.0	1.2
Total Manufacturing	0.2	0.5	0.8	0.7	1.0	1.2

Source(s): E3ME, Cambridge Econometrics.

C.3 Manufacturing output in 2050

European Union output at basic prices, % difference to baseline

	TIAM-ECN_CT40	TIAM-ECN_CT70	TIAM-ECN_CT100	POLES_ct40	POLES_ct70	POLES_ct100
Food, Drink & Tobacco	0.4	1.0	1.1	0.2	0.3	0.3
Textiles, Clothing & Leather	0.3	0.7	0.8	0.7	0.9	1.1
Wood & Paper	0.3	0.8	1.1	0.6	0.9	1.1
Printing & Publishing	0.5	1.2	1.4	0.4	0.5	0.6
Manufactured Fuels	-3.0	-3.1	-4.6	-4.7	-6.5	-7.7
Pharmaceuticals	0.5	1.4	1.8	0.6	0.8	0.9
Other Chemicals	0.6	1.1	1.4	1.0	1.3	1.6
Rubber & Plastics	0.6	1.4	1.9	1.4	2.0	2.5
Non-Metallic Mineral Products	0.4	1.0	1.4	1.6	2.4	2.9
Basic Metals	0.6	1.5	2.1	1.7	2.5	3.0
Metal Goods	1.4	3.0	4.1	2.7	3.8	4.6
Mechanical Engineering	1.4	2.8	3.6	2.8	3.8	4.6
Electronics	1.3	2.9	3.9	3.1	4.1	4.8
Electrical Engineering	1.1	2.4	3.0	2.2	2.9	3.5
Motor Vehicles	1.6	2.5	3.2	2.1	3.2	4.2
Other Transport Equipment	0.0	-0.2	-0.4	-0.3	-0.5	-0.6
Other Manufacturing	0.6	1.2	1.5	1.3	1.8	2.3
Total Manufacturing	0.7	1.6	2.1	1.3	1.8	2.2

Germany output at basic prices, % difference to baseline

	TIAM-ECN_CT40	TIAM-ECN_CT70	TIAM-ECN_CT100	POLES_ct40	POLES_ct70	POLES_ct100
Food, Drink & Tobacco	0.1	0.4	0.6	0.0	-0.1	-0.1
Textiles, Clothing & Leather	0.3	0.6	0.8	0.5	0.5	0.7
Wood & Paper	-0.1	0.6	1.0	0.6	0.9	1.0
Printing & Publishing	0.0	0.6	0.8	0.0	0.0	-0.1
Manufactured Fuels	-7.8	-8.6	-12.8	-6.1	-8.4	-10.0
Pharmaceuticals	-0.4	0.6	0.8	-0.2	-0.3	-0.6
Other Chemicals	0.1	0.3	0.5	0.3	0.3	0.4
Rubber & Plastics	0.1	0.4	0.5	0.2	0.2	0.2
Non-Metallic Mineral Products	1.5	3.1	4.4	6.1	8.8	10.6
Basic Metals	0.3	0.6	1.0	1.0	1.4	1.7
Metal Goods	0.8	1.9	3.0	2.4	3.2	3.7
Mechanical Engineering	0.2	0.5	0.7	1.1	1.4	1.6
Electronics	0.2	0.8	1.3	2.3	2.8	3.1
Electrical Engineering	-0.4	-0.4	-0.5	-0.2	-0.3	-0.4
Motor Vehicles	0.7	1.0	1.1	0.8	1.2	1.5

Other Transport Equipment	0.0	0.2	0.3	0.2	0.4	0.5
Other Manufacturing	0.2	0.5	0.7	1.6	2.2	2.7
Total Manufacturing	0.1	0.5	0.8	0.9	1.1	1.3

France output at basic prices, % difference to baseline

	TIAM-ECN_CT40	TIAM-ECN_CT70	TIAM-ECN_CT100	POLES_ct40	POLES_ct70	POLES_ct100
Food, Drink & Tobacco	0.3	0.6	0.7	0.4	0.5	0.6
Textiles, Clothing & Leather	6.7	14.3	18.4	10.0	12.7	16.8
Wood & Paper	0.3	0.7	0.9	0.7	1.0	1.2
Printing & Publishing	2.7	5.9	7.3	3.2	4.6	5.6
Manufactured Fuels	-3.5	-4.4	-5.9	-9.6	-11.9	-13.6
Pharmaceuticals	1.1	2.2	2.5	0.9	1.2	1.5
Other Chemicals	2.2	3.9	4.8	6.3	7.6	8.6
Rubber & Plastics	1.0	2.1	2.6	1.5	2.0	2.4
Non-Metallic Mineral Products	0.3	0.8	1.1	0.8	1.2	1.4
Basic Metals	-0.1	0.0	-0.1	-0.2	-0.1	0.0
Metal Goods	1.6	3.1	4.3	2.4	3.3	4.1
Mechanical Engineering	2.6	5.8	8.0	6.4	8.7	10.3
Electronics	1.9	5.5	8.4	6.6	8.7	10.2
Electrical Engineering	1.8	4.2	5.6	3.9	5.2	6.0
Motor Vehicles	1.3	2.4	3.4	3.0	4.3	5.4
Other Transport Equipment	-0.2	-1.4	-2.2	-1.2	-1.9	-2.6
Other Manufacturing	0.3	0.6	0.8	0.8	1.2	1.5
Total Manufacturing	0.9	1.9	2.5	1.8	2.4	2.9

Italy output at basic prices, % difference to baseline

	TIAM-ECN_CT40	TIAM-ECN_CT70	TIAM-ECN_CT100	POLES_ct40	POLES_ct70	POLES_ct100
Food, Drink & Tobacco	1.6	3.2	3.5	0.5	0.6	0.8
Textiles, Clothing & Leather	0.6	1.5	1.7	0.4	0.4	0.5
Wood & Paper	0.5	1.1	1.4	0.4	0.6	0.8
Printing & Publishing	0.4	1.0	1.1	0.2	0.3	0.4
Manufactured Fuels	-1.6	-2.0	-3.1	-1.2	-1.9	-2.4
Pharmaceuticals	1.3	3.4	4.1	1.3	1.7	2.0
Other Chemicals	1.0	2.1	2.4	0.8	1.0	1.2
Rubber & Plastics	0.2	0.5	0.7	0.4	0.6	0.8
Non-Metallic Mineral Products	0.4	0.9	1.3	0.7	1.1	1.4
Basic Metals	0.8	2.2	3.0	1.8	2.5	3.1
Metal Goods	1.8	3.6	4.7	2.1	3.1	3.9
Mechanical Engineering	0.7	1.5	1.8	0.9	1.3	1.7
Electronics	0.6	1.6	2.0	1.0	1.6	2.0

Electrical Engineering	1.3	2.5	3.2	1.8	2.6	3.3
Motor Vehicles	3.7	7.5	8.2	2.7	4.4	5.9
Other Transport Equipment	0.9	2.0	2.2	1.0	1.6	2.2
Other Manufacturing	0.1	0.3	0.3	0.1	0.2	0.2
Total Manufacturing	1.0	2.1	2.5	0.9	1.3	1.7

United Kingdom output at basic prices, % difference to baseline

	TIAM-ECN_CT40	TIAM-ECN_CT70	TIAM-ECN_CT100	POLES_ct40	POLES_ct70	POLES_ct100
Food, Drink & Tobacco	0.2	0.7	0.9	0.1	0.2	0.3
Textiles, Clothing & Leather	-1.3	-2.3	-2.6	0.2	0.6	1.5
Wood & Paper	0.4	1.0	1.3	0.6	0.7	0.9
Printing & Publishing	0.8	2.0	1.9	0.1	0.2	0.2
Manufactured Fuels	-10.9	-15.9	-22.9	-14.6	-22.4	-27.6
Pharmaceuticals	1.8	4.0	4.6	0.2	0.4	0.5
Other Chemicals	0.1	0.1	0.1	0.1	0.1	0.1
Rubber & Plastics	0.6	1.2	1.6	0.8	1.2	1.5
Non-Metallic Mineral Products	0.1	0.4	0.5	0.5	0.7	0.8
Basic Metals	0.1	0.4	0.5	0.5	0.7	0.8
Metal Goods	0.2	0.4	0.6	0.6	0.7	0.8
Mechanical Engineering	0.4	0.8	1.3	1.4	1.9	2.2
Electronics	0.5	2.0	3.2	4.1	5.2	6.1
Electrical Engineering	-2.4	-3.0	-4.2	-2.5	-3.5	-4.3
Motor Vehicles	3.4	4.3	4.8	2.0	3.2	4.2
Other Transport Equipment	-0.9	-1.5	-1.6	-1.5	-2.6	-3.6
Other Manufacturing	0.8	1.8	2.2	1.5	2.0	2.4
Total Manufacturing	0.3	0.7	0.9	0.3	0.3	0.3

Turkey output at basic prices, % difference to baseline

	TIAM-ECN_CT40	TIAM-ECN_CT70	TIAM-ECN_CT100	POLES_ct40	POLES_ct70	POLES_ct100
Food, Drink & Tobacco	0.1	0.1	0.1	0.0	0.0	-0.1
Textiles, Clothing & Leather	2.1	0.1	0.0	0.9	1.2	1.9
Wood & Paper	0.2	0.6	0.7	0.5	0.9	1.2
Printing & Publishing	-0.1	0.0	0.0	0.0	0.1	0.1
Manufactured Fuels	-0.9	-1.1	-4.3	-1.0	-1.7	-2.2
Pharmaceuticals	0.2	9.2	12.6	4.0	7.0	9.3
Other Chemicals	0.0	0.0	0.0	0.0	0.0	0.0
Rubber & Plastics	0.4	1.1	1.7	1.4	2.1	2.7
Non-Metallic Mineral Products	0.7	1.6	2.1	2.3	3.9	5.1
Basic Metals	0.8	2.1	2.8	2.5	4.1	5.3
Metal Goods	0.8	1.7	2.7	2.3	4.1	5.6

Mechanical Engineering	0.0	0.0	0.0	0.0	0.0	0.0
Electronics	0.6	1.5	2.2	4.3	7.2	9.1
Electrical Engineering	0.0	0.0	0.0	0.0	0.0	0.0
Motor Vehicles	-0.1	-0.3	-0.1	-0.2	-0.4	-0.6
Other Transport Equipment	0.0	-0.2	0.5	0.1	0.2	0.3
Other Manufacturing	0.2	0.4	0.6	0.3	0.4	0.6
Total Manufacturing	0.3	0.8	1.1	1.2	2.1	2.7

United States output at basic prices, % difference to baseline

	TIAM-ECN_CT40	TIAM-ECN_CT70	TIAM-ECN_CT100	POLES_ct40	POLES_ct70	POLES_ct100
Food, Drink & Tobacco	0.0	0.1	0.6	0.1	0.2	0.3
Textiles, Clothing & Leather	1.1	1.7	2.4	0.1	0.1	0.2
Wood & Paper	0.0	0.0	0.3	0.2	0.3	0.4
Printing & Publishing	0.8	1.2	2.0	0.6	0.9	1.1
Manufactured Fuels	-2.8	-4.1	-5.6	-1.8	-2.9	-3.9
Pharmaceuticals	0.7	1.7	2.1	-0.1	-0.4	-0.6
Other Chemicals	1.6	2.3	2.5	0.8	1.1	1.4
Rubber & Plastics	1.0	1.5	1.8	0.7	0.9	1.1
Non-Metallic Mineral Products	0.5	0.9	1.1	0.6	1.0	1.2
Basic Metals	4.9	7.0	9.4	3.7	5.6	7.0
Metal Goods	1.4	2.1	2.6	1.6	2.1	2.4
Mechanical Engineering	2.4	3.0	3.8	2.4	3.2	3.6
Electronics	2.3	3.0	3.9	2.8	4.5	5.8
Electrical Engineering	0.6	0.8	1.0	0.8	1.0	1.1
Motor Vehicles	5.7	7.6	9.4	2.1	3.8	5.3
Other Transport Equipment	0.3	0.5	0.7	0.2	0.3	0.5
Other Manufacturing	0.5	0.6	0.9	0.4	0.6	0.8
Total Manufacturing	0.9	1.3	1.6	0.7	1.0	1.2

Japan output at basic prices, % difference to baseline

	TIAM-ECN_CT40	TIAM-ECN_CT70	TIAM-ECN_CT100	POLES_ct40	POLES_ct70	POLES_ct100
Food, Drink & Tobacco	-0.1	-0.3	-0.6	-0.1	-0.1	-0.1
Textiles, Clothing & Leather	-0.2	-0.5	-0.7	0.0	0.0	0.0
Wood & Paper	0.1	0.3	0.2	0.3	0.4	0.4
Printing & Publishing	-0.1	-0.4	-0.7	0.5	0.6	0.7
Manufactured Fuels	-6.7	-7.7	-12.2	-11.5	-15.3	-17.6
Pharmaceuticals	0.5	1.4	2.5	0.9	1.3	1.6
Other Chemicals	0.2	0.1	0.5	0.6	0.9	1.2
Rubber & Plastics	0.1	0.4	0.6	0.3	0.4	0.5
Non-Metallic Mineral Products	0.2	0.3	0.2	0.5	0.6	0.8

Basic Metals	0.5	1.1	2.0	1.4	1.8	2.3
Metal Goods	1.7	2.4	2.7	2.4	2.8	3.4
Mechanical Engineering	5.3	8.8	9.7	4.2	5.5	6.6
Electronics	2.2	3.1	3.9	6.9	9.6	12.1
Electrical Engineering	1.5	2.5	2.9	2.2	2.6	3.2
Motor Vehicles	1.9	-4.4	-1.3	11.4	17.0	22.7
Other Transport Equipment	0.0	-0.1	-0.1	0.3	0.4	0.5
Other Manufacturing	-0.1	-0.3	-0.2	0.1	0.1	0.2
Total Manufacturing	0.5	0.5	0.7	1.3	1.8	2.4

Canada output at basic prices, % difference to baseline

	TIAM-ECN_CT40	TIAM-ECN_CT70	TIAM-ECN_CT100	POLES_ct40	POLES_ct70	POLES_ct100
Food, Drink & Tobacco	0.0	0.1	0.1	0.1	0.1	0.1
Textiles, Clothing & Leather	0.0	0.0	0.6	1.1	1.0	2.4
Wood & Paper	0.1	0.3	0.4	0.3	0.4	0.6
Printing & Publishing	0.0	0.0	0.1	0.5	0.7	1.0
Manufactured Fuels	-0.6	-1.6	-3.4	-5.3	-7.9	-9.8
Pharmaceuticals	-0.3	-0.9	-1.3	-0.5	-0.6	-0.7
Other Chemicals	-0.1	0.4	0.8	0.2	0.4	0.5
Rubber & Plastics	0.4	1.0	1.3	0.8	1.0	1.3
Non-Metallic Mineral Products	0.2	0.1	0.0	0.7	1.2	1.6
Basic Metals	0.3	0.6	0.8	1.3	1.7	2.1
Metal Goods	3.4	4.2	4.8	2.7	3.8	4.7
Mechanical Engineering	0.9	1.3	1.7	0.8	1.2	1.4
Electronics	0.8	1.6	2.5	3.6	5.8	7.8
Electrical Engineering	-1.6	-1.7	-2.0	-1.2	-1.8	-2.2
Motor Vehicles	1.4	1.4	1.4	3.3	5.6	7.8
Other Transport Equipment	-0.2	-1.5	-3.0	1.2	2.3	3.4
Other Manufacturing	0.2	0.2	0.4	0.8	1.2	1.6
Total Manufacturing	0.5	0.6	0.6	0.7	1.1	1.6

Australia output at basic prices, % difference to baseline

	TIAM-ECN_CT40	TIAM-ECN_CT70	TIAM-ECN_CT100	POLES_ct40	POLES_ct70	POLES_ct100
Food, Drink & Tobacco	0.3	0.6	0.9	0.1	0.2	0.2
Textiles, Clothing & Leather	0.0	0.0	0.0	0.0	0.0	0.0
Wood & Paper	0.4	0.9	1.1	0.5	0.8	1.0
Printing & Publishing	0.3	0.6	0.8	0.2	0.3	0.3
Manufactured Fuels	-1.0	-3.4	-9.1	-3.8	-5.9	-7.7
Pharmaceuticals	0.2	0.3	0.4	0.1	0.1	0.1
Other Chemicals	1.0	1.5	2.0	0.5	0.7	0.8

Rubber & Plastics	2.1	2.3	2.8	1.1	1.3	1.5
Non-Metallic Mineral Products	0.2	0.3	0.3	0.4	0.5	0.6
Basic Metals	0.5	0.5	0.6	0.3	0.4	0.5
Metal Goods	5.0	6.8	7.7	2.3	3.1	3.7
Mechanical Engineering	8.3	8.6	10.2	5.3	6.4	7.2
Electronics	6.6	7.8	10.6	7.7	10.6	13.0
Electrical Engineering	1.9	1.9	2.3	2.3	3.0	3.4
Motor Vehicles	0.0	0.0	0.0	0.0	0.0	0.0
Other Transport Equipment	-0.6	-2.5	-6.5	-1.5	-2.3	-3.2
Other Manufacturing	-0.2	0.0	-0.1	0.0	-0.1	-0.1
Total Manufacturing	1.3	1.5	1.5	0.8	1.0	1.1

Russia output at basic prices, % difference to baseline

	TIAM-ECN_CT40	TIAM-ECN_CT70	TIAM-ECN_CT100	POLES_ct40	POLES_ct70	POLES_ct100
Food, Drink & Tobacco	0.1	-0.3	-0.2	0.2	0.3	0.4
Textiles, Clothing & Leather	0.0	0.0	0.0	0.0	0.0	0.0
Wood & Paper	-0.6	-0.7	-0.8	-0.2	-0.2	-0.2
Printing & Publishing	-0.1	0.0	0.0	0.1	0.1	0.1
Manufactured Fuels	0.0	0.0	0.0	0.0	0.0	0.0
Pharmaceuticals	0.6	-1.1	-1.3	-0.6	-0.6	-0.5
Other Chemicals	-4.1	5.7	6.1	-2.9	-4.7	-6.4
Rubber & Plastics	0.3	0.3	0.4	-0.1	-0.1	-0.1
Non-Metallic Mineral Products	-0.1	-0.5	-0.5	0.7	1.1	1.3
Basic Metals	0.2	1.1	2.5	1.8	2.7	3.4
Metal Goods	0.8	1.9	2.7	1.2	1.7	2.0
Mechanical Engineering	2.7	8.1	10.8	3.6	4.7	5.7
Electronics	1.8	3.5	4.5	5.0	7.0	8.6
Electrical Engineering	-0.1	-0.1	-0.2	0.0	-0.1	-0.1
Motor Vehicles	0.9	0.7	-3.8	1.1	1.8	2.5
Other Transport Equipment	0.0	0.0	-0.2	-0.5	-0.6	-0.7
Other Manufacturing	0.2	0.2	0.2	0.6	0.7	0.8
Total Manufacturing	0.3	1.0	1.3	0.6	0.9	1.0

China output at basic prices, % difference to baseline

	TIAM-ECN_CT40	TIAM-ECN_CT70	TIAM-ECN_CT100	POLES_ct40	POLES_ct70	POLES_ct100
Food, Drink & Tobacco	0.7	1.7	1.9	0.1	0.1	-0.1
Textiles, Clothing & Leather	0.4	0.9	0.9	0.1	0.1	0.1
Wood & Paper	3.8	8.5	9.0	3.3	5.0	6.8
Printing & Publishing	1.3	2.6	2.8	0.6	0.9	1.1
Manufactured Fuels	0.0	0.0	0.0	0.0	0.0	0.0

Pharmaceuticals	1.3	2.5	2.7	1.2	1.6	2.1
Other Chemicals	1.0	1.7	1.8	0.4	0.7	0.9
Rubber & Plastics	1.2	2.6	2.8	0.5	0.8	1.0
Non-Metallic Mineral Products	0.5	0.8	0.8	0.5	0.9	1.2
Basic Metals	0.5	1.0	1.1	0.3	0.4	0.6
Metal Goods	9.0	17.1	18.2	5.4	8.1	10.9
Mechanical Engineering	6.1	12.5	13.6	3.0	4.4	6.1
Electronics	1.2	2.1	2.1	0.7	1.0	1.5
Electrical Engineering	1.4	2.5	2.7	0.6	0.9	1.3
Motor Vehicles	7.1	14.3	14.9	1.5	2.4	3.4
Other Transport Equipment	0.9	1.9	2.0	0.1	0.1	0.2
Other Manufacturing	2.5	6.4	6.8	2.0	3.1	4.1
Total Manufacturing	1.1	2.3	2.4	0.5	0.8	1.1

India output at basic prices, % difference to baseline

	TIAM-ECN_CT40	TIAM-ECN_CT70	TIAM-ECN_CT100	POLES_ct40	POLES_ct70	POLES_ct100
Food, Drink & Tobacco	-0.2	-0.2	0.1	-0.5	-0.3	0.0
Textiles, Clothing & Leather	0.1	0.1	0.4	0.0	0.0	0.0
Wood & Paper	0.0	0.1	0.2	0.2	0.2	0.3
Printing & Publishing	0.0	0.0	0.3	0.0	0.0	0.1
Manufactured Fuels	0.0	0.0	0.0	0.0	0.0	0.0
Pharmaceuticals	0.0	0.1	0.5	0.2	0.3	0.4
Other Chemicals	-0.1	0.3	0.7	0.1	0.2	0.4
Rubber & Plastics	0.0	0.0	-0.1	0.0	0.0	0.0
Non-Metallic Mineral Products	-0.2	-0.4	0.2	-0.7	-0.7	-0.6
Basic Metals	0.0	0.2	0.4	0.2	0.3	0.3
Metal Goods	0.1	0.8	1.4	0.4	0.5	0.6
Mechanical Engineering	0.0	20.3	35.6	20.3	21.6	29.1
Electronics	-0.1	1.1	3.5	2.1	2.4	3.4
Electrical Engineering	-6.5	28.4	51.9	31.9	33.7	44.9
Motor Vehicles	0.7	-1.9	3.5	-1.4	-0.7	-0.1
Other Transport Equipment	0.0	-0.2	0.4	0.0	0.1	0.1
Other Manufacturing	0.0	0.1	0.0	0.0	0.0	0.1
Total Manufacturing	-0.1	1.1	2.3	0.8	0.9	1.3

Brazil output at basic prices, % difference to baseline

	TIAM-ECN_CT40	TIAM-ECN_CT70	TIAM-ECN_CT100	POLES_ct40	POLES_ct70	POLES_ct100
Food, Drink & Tobacco	0.2	0.1	-0.2	-0.3	0.1	0.5
Textiles, Clothing & Leather	0.0	-0.2	-0.6	-0.3	0.0	0.4
Wood & Paper	0.2	0.2	-0.3	0.1	0.5	0.9

Printing & Publishing	0.1	0.1	-0.3	-0.1	0.2	0.5
Manufactured Fuels	-2.3	-2.5	-3.1	-3.3	-4.9	-6.2
Pharmaceuticals	0.9	1.2	0.9	0.7	1.1	1.5
Other Chemicals	0.3	0.4	-0.1	0.0	0.4	0.8
Rubber & Plastics	0.6	1.2	0.4	0.3	0.7	1.2
Non-Metallic Mineral Products	0.0	0.3	-0.8	0.7	1.0	1.3
Basic Metals	1.0	1.8	1.2	0.7	1.2	1.6
Metal Goods	3.8	7.3	8.3	2.7	4.2	5.7
Mechanical Engineering	6.0	11.6	12.3	4.0	6.1	7.8
Electronics	0.0	0.0	0.0	0.0	0.0	0.0
Electrical Engineering	-0.7	-1.8	-2.8	-0.5	-0.8	-1.1
Motor Vehicles	0.4	0.4	-2.2	0.6	1.2	1.8
Other Transport Equipment	0.2	0.4	-0.9	0.0	0.2	0.4
Other Manufacturing	0.0	-0.1	-0.4	-0.1	0.0	0.0
Total Manufacturing	0.5	0.8	0.2	0.1	0.4	0.8

Mexico output at basic prices, % difference to baseline

	TIAM-ECN_CT40	TIAM-ECN_CT70	TIAM-ECN_CT100	POLES_ct40	POLES_ct70	POLES_ct100
Food, Drink & Tobacco	-0.1	-0.2	-0.2	0.0	0.0	0.0
Textiles, Clothing & Leather	-0.9	-1.9	-0.5	1.0	1.1	1.9
Wood & Paper	0.0	0.0	0.3	0.3	0.4	0.5
Printing & Publishing	-0.9	-1.8	1.1	0.3	0.5	0.8
Manufactured Fuels	-4.8	-6.6	-18.3	-4.3	-6.5	-8.5
Pharmaceuticals	-0.1	-0.2	0.0	0.0	0.0	0.0
Other Chemicals	-1.0	-1.5	-0.1	0.1	0.2	0.3
Rubber & Plastics	0.7	0.0	6.0	1.5	2.5	3.2
Non-Metallic Mineral Products	0.5	0.4	0.7	1.0	1.6	2.1
Basic Metals	0.2	0.4	1.4	0.4	0.6	0.8
Metal Goods	5.7	6.0	9.4	3.7	6.0	7.4
Mechanical Engineering	2.2	2.4	5.1	1.6	2.7	3.1
Electronics	0.5	0.2	2.1	1.1	2.0	2.7
Electrical Engineering	0.0	0.0	0.0	0.0	0.0	0.0
Motor Vehicles	-0.2	-1.1	2.0	0.6	1.0	1.5
Other Transport Equipment	-2.7	-7.7	3.5	1.0	2.1	3.2
Other Manufacturing	0.5	0.2	1.6	1.0	1.5	2.0
Total Manufacturing	0.0	-0.4	0.9	0.4	0.7	1.0

Argentina output at basic prices, % difference to baseline

	TIAM-ECN_CT40	TIAM-ECN_CT70	TIAM-ECN_CT100	POLES_ct40	POLES_ct70	POLES_ct100
Food, Drink & Tobacco	-0.1	-0.2	-0.2	-0.3	-0.5	-0.6

Textiles, Clothing & Leather	-0.2	-0.1	-0.3	-0.4	-0.8	-1.0
Wood & Paper	-0.1	-0.1	0.0	0.1	0.2	0.2
Printing & Publishing	0.2	0.4	0.5	-0.1	-0.1	-0.2
Manufactured Fuels	-3.8	-6.1	-9.9	-7.5	-12.3	-16.0
Pharmaceuticals	0.1	0.3	0.2	0.8	1.2	1.5
Other Chemicals	0.0	0.1	0.1	-0.3	-0.5	-0.6
Rubber & Plastics	0.3	1.5	2.9	1.0	1.6	2.2
Non-Metallic Mineral Products	0.0	0.0	0.0	0.2	0.3	0.4
Basic Metals	0.0	0.2	1.5	1.2	1.9	2.4
Metal Goods	0.6	2.5	5.0	1.9	2.7	3.3
Mechanical Engineering	0.9	7.9	18.7	8.3	12.3	15.7
Electronics	1.9	4.3	3.8	5.3	8.9	12.2
Electrical Engineering	3.1	19.2	49.3	10.2	15.6	21.1
Motor Vehicles	1.2	2.4	-8.6	7.0	12.1	16.7
Other Transport Equipment	0.3	0.6	-2.1	1.6	2.8	3.9
Other Manufacturing	0.0	0.0	0.1	0.0	0.1	0.1
Total Manufacturing	-0.4	-0.2	-0.5	0.1	0.2	0.4

Republic of Korea output at basic prices, % difference to baseline

	TIAM-ECN_CT40	TIAM-ECN_CT70	TIAM-ECN_CT100	POLES_ct40	POLES_ct70	POLES_ct100
Food, Drink & Tobacco	0.1	0.5	0.8	-0.1	-0.1	-0.1
Textiles, Clothing & Leather	0.1	0.2	0.3	0.0	0.0	0.0
Wood & Paper	0.7	1.2	1.5	0.6	0.9	1.3
Printing & Publishing	0.3	0.7	0.9	0.4	0.5	0.7
Manufactured Fuels	-1.0	-4.1	-5.6	-2.7	-3.7	-4.5
Pharmaceuticals	0.3	1.1	1.5	0.3	0.5	0.6
Other Chemicals	0.8	1.6	1.9	0.6	0.9	1.2
Rubber & Plastics	1.1	2.3	2.6	0.9	1.4	1.9
Non-Metallic Mineral Products	1.0	1.6	2.0	1.3	2.2	2.9
Basic Metals	1.6	3.0	3.4	1.2	1.9	2.5
Metal Goods	4.9	8.5	9.0	2.5	3.7	5.1
Mechanical Engineering	2.5	3.9	4.1	1.1	1.6	2.0
Electronics	0.2	0.3	0.4	0.2	0.3	0.4
Electrical Engineering	1.1	1.8	2.1	0.8	1.3	1.7
Motor Vehicles	0.4	1.7	2.5	1.3	2.1	2.8
Other Transport Equipment	0.3	0.5	0.3	0.1	0.1	0.1
Other Manufacturing	0.1	0.3	0.4	0.2	0.3	0.4
Total Manufacturing	0.7	1.3	1.5	0.5	0.8	1.1

Indonesia output at basic prices, % difference to baseline

	TIAM-ECN_CT40	TIAM-ECN_CT70	TIAM-ECN	POLES_ct40	POLES_ct70	POLES_ct100

			_CT100			
Food, Drink & Tobacco	0.8	1.4	2.0	-5.3	-4.2	-2.9
Textiles, Clothing & Leather	0.4	0.9	1.1	-2.6	-1.9	-1.2
Wood & Paper	0.0	0.1	0.1	-0.1	-0.1	0.0
Printing & Publishing	0.5	1.1	1.1	-1.2	-1.0	-0.7
Manufactured Fuels	0.0	0.0	0.0	0.0	0.0	0.0
Pharmaceuticals	0.8	1.4	1.4	-1.5	-1.1	-0.7
Other Chemicals	1.3	2.1	2.4	-1.1	-0.6	0.0
Rubber & Plastics	0.5	1.1	1.1	0.2	0.3	0.4
Non-Metallic Mineral Products	0.5	0.8	0.8	0.2	0.4	0.6
Basic Metals	21.0	32.2	35.1	3.4	7.0	10.0
Metal Goods	10.3	16.5	16.8	0.7	1.6	2.4
Mechanical Engineering	51.3	85.3	87.9	7.8	12.1	15.3
Electronics	3.1	4.6	5.3	0.2	0.9	1.6
Electrical Engineering	6.1	9.8	10.6	1.1	1.9	2.6
Motor Vehicles	0.8	0.1	1.0	0.0	0.4	0.8
Other Transport Equipment	0.6	0.9	1.5	0.3	0.5	0.7
Other Manufacturing	5.4	7.9	9.4	-2.2	-0.3	1.7
Total Manufacturing	3.5	5.3	6.0	-1.0	-0.2	0.5

Proxy for Saudi Arabia (OPEC) output at basic prices, % difference to baseline

	TIAM-ECN _CT40	TIAM-ECN _CT70	TIAM-ECN _CT100	POLES _ct40	POLES _ct70	POLES _ct100
Food, Drink & Tobacco	-2.6	-3.8	-4.0	0.3	0.3	-0.2
Textiles, Clothing & Leather	-0.2	-0.5	-0.4	0.3	0.3	0.3
Wood & Paper	-1.6	-2.5	-2.1	2.3	3.2	3.5
Printing & Publishing	-0.1	-0.1	0.2	0.7	0.9	1.0
Manufactured Fuels	-52.5	-68.5	-94.2	-58.5	-58.5	-58.5
Pharmaceuticals	-0.2	-0.7	-0.6	0.6	0.8	0.8
Other Chemicals	-0.2	-0.3	-0.1	0.3	0.4	0.4
Rubber & Plastics	-0.3	0.0	2.0	1.2	1.7	1.8
Non-Metallic Mineral Products	-0.5	-0.7	-0.5	1.0	1.5	1.9
Basic Metals	0.1	0.7	2.0	1.2	1.7	2.2
Metal Goods	0.1	2.3	8.5	2.1	3.1	3.9
Mechanical Engineering	1.1	2.3	2.9	1.0	1.3	1.7
Electronics	-0.1	0.3	2.3	2.2	3.2	4.0
Electrical Engineering	-0.1	2.3	12.5	7.0	9.9	11.8
Motor Vehicles	0.2	-0.3	-1.3	1.2	1.9	2.3
Other Transport Equipment	-0.7	-1.4	-2.0	1.0	1.5	1.5
Other Manufacturing	-0.7	-1.7	-1.1	1.3	1.7	1.6
Total Manufacturing	-1.0	-1.1	-0.7	1.0	1.5	1.7

Proxy for South Africa (RoW) output at basic prices, % difference to baseline

	TIAM-ECN_CT40	TIAM-ECN_CT70	TIAM-ECN_CT100	POLES_ct40	POLES_ct70	POLES_ct100
Food, Drink & Tobacco	-1.1	-1.0	-0.9	-0.3	-0.3	-0.4
Textiles, Clothing & Leather	0.0	0.2	0.5	0.5	0.6	1.0
Wood & Paper	0.6	1.0	2.3	1.5	2.1	2.6
Printing & Publishing	-0.1	0.0	0.0	0.0	0.1	0.1
Manufactured Fuels	-7.6	-9.2	-16.6	-4.3	-7.8	-10.8
Pharmaceuticals	0.2	-0.2	-0.4	0.4	0.5	0.7
Other Chemicals	-0.9	-8.9	-8.6	2.4	3.6	4.3
Rubber & Plastics	-0.1	-1.8	-1.8	0.2	0.3	0.3
Non-Metallic Mineral Products	-1.7	-3.4	-4.7	0.1	0.2	0.3
Basic Metals	0.1	0.6	1.1	0.5	0.7	0.8
Metal Goods	0.0	0.0	0.0	0.0	0.0	0.0
Mechanical Engineering	0.3	0.4	2.2	1.2	1.6	1.9
Electronics	0.9	0.6	-0.6	0.8	1.3	1.8
Electrical Engineering	0.0	0.0	0.0	0.0	0.0	0.0
Motor Vehicles	-0.1	-0.1	0.4	0.0	-0.1	-0.1
Other Transport Equipment	0.3	0.1	-0.3	0.3	0.6	0.8
Other Manufacturing	-0.1	-0.2	-0.3	0.0	0.0	0.0
Total Manufacturing	-0.9	-1.2	-1.7	-0.2	-0.4	-0.5

World output at basic prices, % difference to baseline

	TIAM-ECN_CT40	TIAM-ECN_CT70	TIAM-ECN_CT100	POLES_ct40	POLES_ct70	POLES_ct100
Food, Drink & Tobacco	0.1	0.4	0.5	-0.1	0.0	0.0
Textiles, Clothing & Leather	0.3	0.7	0.8	0.1	0.1	0.2
Wood & Paper	0.5	1.2	1.5	0.9	1.3	1.6
Printing & Publishing	0.7	1.2	1.5	0.4	0.7	0.8
Manufactured Fuels	-2.5	-3.4	-5.4	-2.1	-3.2	-4.0
Pharmaceuticals	0.8	1.5	1.8	0.8	1.0	1.2
Other Chemicals	0.6	1.1	1.3	0.4	0.6	0.8
Rubber & Plastics	0.8	1.5	1.8	0.6	0.9	1.1
Non-Metallic Mineral Products	0.4	0.6	0.7	0.7	1.1	1.5
Basic Metals	0.9	1.6	1.8	0.6	0.9	1.1
Metal Goods	2.3	4.2	5.6	2.2	3.2	4.0
Mechanical Engineering	3.3	6.6	7.6	2.3	3.2	4.1
Electronics	0.9	1.8	2.3	1.2	1.8	2.4
Electrical Engineering	1.1	2.3	2.7	1.0	1.3	1.7
Motor Vehicles	1.8	2.2	2.8	1.6	2.7	3.7
Other Transport Equipment	0.5	1.0	1.1	0.1	0.2	0.3
Other Manufacturing	0.4	0.7	0.9	0.6	0.9	1.1
Total Manufacturing	0.8	1.5	1.7	0.6	0.9	1.2

Source(s): E3ME, Cambridge Econometrics.

C.4 Manufacturing employment in 2030

European Union employment, % difference to baseline

	TIAM-ECN_CT40	TIAM-ECN_CT70	TIAM-ECN_CT100	POLES_ct40	POLES_ct70	POLES_ct100
Food, Drink & Tobacco	0.0	0.1	0.2	0.0	0.1	0.1
Textiles, Clothing & Leather	0.1	0.2	0.3	0.1	0.2	0.3
Wood & Paper	-0.1	0.0	0.0	0.0	0.1	0.1
Printing & Publishing	0.0	0.1	0.3	0.2	0.2	0.3
Manufactured Fuels	2.1	2.0	2.0	-0.2	-0.1	0.0
Pharmaceuticals	0.0	-0.1	-0.3	0.0	0.0	0.0
Other Chemicals	0.0	0.1	0.2	0.2	0.3	0.3
Rubber & Plastics	0.0	0.1	0.2	0.1	0.1	0.1
Non-Metallic Mineral Products	0.0	0.0	0.3	0.5	0.7	0.9
Basic Metals	0.1	0.2	0.3	0.3	0.4	0.5
Metal Goods	0.2	0.5	0.8	0.7	0.9	1.1
Mechanical Engineering	0.0	-0.1	0.1	0.4	0.5	0.7
Electronics	0.0	0.2	0.4	0.6	0.8	0.9
Electrical Engineering	0.1	0.2	0.3	0.3	0.4	0.5
Motor Vehicles	0.0	0.0	0.3	0.2	0.3	0.4
Other Transport Equipment	0.0	0.3	0.6	0.5	0.8	1.1
Other Manufacturing	-0.1	-0.2	-0.3	-0.1	-0.1	-0.1
Total Manufacturing	0.0	0.1	0.2	0.2	0.3	0.4

Germany employment, % difference to baseline

	TIAM-ECN_CT40	TIAM-ECN_CT70	TIAM-ECN_CT100	POLES_ct40	POLES_ct70	POLES_ct100
Food, Drink & Tobacco	0.1	0.1	0.3	0.0	-0.1	-0.1
Textiles, Clothing & Leather	-0.1	0.0	0.0	0.1	0.1	0.1
Wood & Paper	0.0	0.1	0.1	0.2	0.2	0.2
Printing & Publishing	-0.2	-0.3	-0.2	0.1	0.1	0.1
Manufactured Fuels	-4.6	-6.7	-8.7	-0.4	-0.1	-0.3
Pharmaceuticals	0.0	0.0	0.0	-0.1	-0.1	-0.2
Other Chemicals	0.0	0.0	0.0	0.1	0.1	0.1
Rubber & Plastics	0.0	0.0	0.0	0.0	0.0	0.0
Non-Metallic Mineral Products	0.5	0.5	0.7	1.2	1.5	1.8
Basic Metals	0.1	0.2	0.2	0.3	0.4	0.5
Metal Goods	0.0	0.0	0.0	0.0	0.0	0.0
Mechanical Engineering	-0.1	-0.3	-0.3	0.0	0.0	0.1
Electronics	0.0	0.2	0.2	0.1	0.2	0.3
Electrical Engineering	0.2	0.1	-0.1	-0.1	0.0	0.1
Motor Vehicles	0.0	0.0	0.0	0.0	0.0	0.0
Other Transport Equipment	0.0	0.0	0.0	0.0	0.0	0.0

Other Manufacturing	0.1	0.2	0.3	0.1	0.2	0.2
Total Manufacturing	0.0	0.0	0.0	0.1	0.1	0.1

France employment, % difference to baseline

	TIAM-ECN_CT40	TIAM-ECN_CT70	TIAM-ECN_CT100	POLES_ct40	POLES_ct70	POLES_ct100
Food, Drink & Tobacco	0.2	0.4	0.6	0.1	0.2	0.2
Textiles, Clothing & Leather	0.3	0.4	1.0	0.4	0.6	0.8
Wood & Paper	-0.1	-0.3	-0.5	-0.7	-0.8	-0.9
Printing & Publishing	0.3	0.5	0.8	0.3	0.4	0.5
Manufactured Fuels	-3.7	-6.0	-7.9	-2.9	-4.6	-6.1
Pharmaceuticals	0.0	0.0	0.0	0.0	0.0	0.0
Other Chemicals	0.1	-0.2	-0.1	0.0	-0.1	-0.1
Rubber & Plastics	0.0	0.1	0.1	0.0	0.1	0.1
Non-Metallic Mineral Products	-0.3	-0.4	-0.6	-0.5	-0.6	-0.7
Basic Metals	1.0	1.1	1.4	0.4	0.4	0.4
Metal Goods	-0.1	-0.1	-0.1	-0.2	-0.2	-0.2
Mechanical Engineering	0.0	-0.2	-0.1	0.2	0.2	0.3
Electronics	-0.1	-0.2	-0.2	-0.1	-0.1	-0.2
Electrical Engineering	0.2	0.5	0.6	0.1	0.4	0.5
Motor Vehicles	-0.2	-0.2	0.4	0.1	0.4	0.6
Other Transport Equipment	0.0	1.0	2.3	1.7	2.7	3.7
Other Manufacturing	-0.1	-0.2	-0.4	-0.3	-0.4	-0.4
Total Manufacturing	0.0	0.1	0.2	0.0	0.1	0.1

Italy employment, % difference to baseline

	TIAM-ECN_CT40	TIAM-ECN_CT70	TIAM-ECN_CT100	POLES_ct40	POLES_ct70	POLES_ct100
Food, Drink & Tobacco	0.0	0.0	0.0	0.0	0.0	0.0
Textiles, Clothing & Leather	-0.1	0.0	0.1	0.0	0.1	0.1
Wood & Paper	-0.1	0.0	0.2	0.2	0.3	0.3
Printing & Publishing	0.4	1.3	1.6	1.1	1.6	2.0
Manufactured Fuels	-0.5	-0.7	-1.0	0.0	-0.1	-0.2
Pharmaceuticals	0.0	0.0	0.0	0.0	0.1	0.1
Other Chemicals	0.1	0.2	0.3	0.1	0.1	0.2
Rubber & Plastics	0.0	0.1	0.3	0.2	0.2	0.3
Non-Metallic Mineral Products	0.0	0.0	0.1	0.0	0.0	0.1
Basic Metals	0.1	-0.1	-0.2	-0.3	-0.5	-0.6
Metal Goods	0.9	1.9	2.8	1.7	2.3	2.8
Mechanical Engineering	0.0	-0.6	-0.3	-0.2	-0.4	-0.3
Electronics	0.1	0.2	0.5	0.2	0.2	0.3
Electrical Engineering	0.0	0.0	0.0	0.0	0.0	-0.1

Motor Vehicles	0.2	-0.1	-0.5	-0.2	-0.4	-0.5
Other Transport Equipment	0.1	0.5	1.1	0.6	1.0	1.3
Other Manufacturing	0.0	0.0	0.0	0.0	0.0	0.0
Total Manufacturing	0.1	0.2	0.4	0.2	0.3	0.4

United Kingdom employment, % difference to baseline

	TIAM-ECN_CT40	TIAM-ECN_CT70	TIAM-ECN_CT100	POLES_ct40	POLES_ct70	POLES_ct100
Food, Drink & Tobacco	-0.3	-0.3	-0.5	0.0	0.0	0.0
Textiles, Clothing & Leather	0.1	0.2	-0.1	0.8	1.2	1.5
Wood & Paper	-0.1	0.1	0.3	0.3	0.4	0.5
Printing & Publishing	0.4	0.6	1.6	0.1	0.1	0.1
Manufactured Fuels	-5.8	-9.7	-11.4	-2.4	-4.7	-6.8
Pharmaceuticals	0.0	-0.7	-2.8	0.3	0.2	0.0
Other Chemicals	0.0	0.0	0.2	0.0	0.1	0.1
Rubber & Plastics	-0.1	0.1	0.3	0.2	0.3	0.4
Non-Metallic Mineral Products	-0.5	-0.6	-0.2	0.6	0.6	0.6
Basic Metals	-0.2	-0.5	-0.5	-0.2	-0.4	-0.5
Metal Goods	-1.3	-2.5	-2.7	-1.0	-1.6	-1.8
Mechanical Engineering	0.8	1.0	1.5	1.3	1.7	2.1
Electronics	-0.1	0.5	2.4	3.4	4.4	5.1
Electrical Engineering	-2.5	-3.0	-4.0	-2.2	-2.7	-3.2
Motor Vehicles	-0.1	0.0	1.3	0.3	0.6	0.8
Other Transport Equipment	0.0	0.0	0.0	0.0	0.0	0.0
Other Manufacturing	0.1	0.3	0.6	0.3	0.4	0.5
Total Manufacturing	-0.2	-0.3	-0.1	0.2	0.2	0.3

Turkey employment, % difference to baseline

	TIAM-ECN_CT40	TIAM-ECN_CT70	TIAM-ECN_CT100	POLES_ct40	POLES_ct70	POLES_ct100
Food, Drink & Tobacco	0.0	0.1	0.1	0.0	0.0	0.0
Textiles, Clothing & Leather	0.1	0.1	0.1	0.3	0.5	0.6
Wood & Paper	0.0	0.0	0.0	0.0	0.0	0.0
Printing & Publishing	0.2	0.3	0.8	0.1	0.2	0.2
Manufactured Fuels	-0.3	-0.5	-1.0	0.0	-0.1	-0.1
Pharmaceuticals	0.0	0.0	0.0	0.0	0.0	0.0
Other Chemicals	0.0	0.0	0.0	0.0	0.0	0.0
Rubber & Plastics	0.1	0.1	0.2	0.1	0.2	0.2
Non-Metallic Mineral Products	0.0	0.1	0.2	0.2	0.2	0.3
Basic Metals	0.2	0.3	0.5	0.4	0.5	0.6
Metal Goods	0.6	1.3	2.1	1.1	1.6	1.9
Mechanical Engineering	0.0	0.0	0.0	0.0	0.0	0.0

Electronics	0.0	0.0	0.0	0.0	0.0	0.0
Electrical Engineering	0.0	0.0	0.0	0.0	0.0	0.0
Motor Vehicles	0.0	0.0	0.0	0.0	0.0	0.0
Other Transport Equipment	0.0	0.0	0.0	0.0	0.0	0.0
Other Manufacturing	0.0	-0.1	0.0	0.0	-0.1	-0.1
Total Manufacturing	0.1	0.2	0.3	0.2	0.3	0.3

United States employment, % difference to baseline

	TIAM-ECN_CT40	TIAM-ECN_CT70	TIAM-ECN_CT100	POLES_ct40	POLES_ct70	POLES_ct100
Food, Drink & Tobacco	-0.1	-0.4	-0.3	0.1	0.2	0.3
Textiles, Clothing & Leather	0.2	-0.2	-0.1	0.5	0.8	1.0
Wood & Paper	0.1	0.2	0.3	0.1	0.2	0.3
Printing & Publishing	0.9	1.4	1.7	0.2	0.2	0.3
Manufactured Fuels	-0.4	-0.7	-0.9	-0.1	-0.3	-0.4
Pharmaceuticals	-0.1	-0.2	-0.2	0.2	0.2	0.2
Other Chemicals	0.4	0.3	0.4	0.2	0.3	0.4
Rubber & Plastics	0.6	0.4	0.5	0.5	0.7	0.9
Non-Metallic Mineral Products	0.3	0.3	0.4	0.1	0.2	0.3
Basic Metals	0.0	-1.0	-0.8	0.1	0.5	0.8
Metal Goods	3.3	3.3	3.5	0.8	1.3	1.6
Mechanical Engineering	2.3	2.0	2.2	0.7	1.1	1.4
Electronics	0.1	-0.4	-0.4	0.7	1.2	1.6
Electrical Engineering	0.7	0.5	0.6	0.3	0.5	0.6
Motor Vehicles	0.0	0.0	0.0	0.0	0.0	0.0
Other Transport Equipment	-0.1	0.2	0.2	0.2	0.2	0.3
Other Manufacturing	0.3	0.6	0.7	0.1	0.1	0.1
Total Manufacturing	0.7	0.7	0.7	0.3	0.5	0.7

Japan employment, % difference to baseline

	TIAM-ECN_CT40	TIAM-ECN_CT70	TIAM-ECN_CT100	POLES_ct40	POLES_ct70	POLES_ct100
Food, Drink & Tobacco	-0.1	-0.2	-0.2	0.0	0.0	0.0
Textiles, Clothing & Leather	0.0	0.0	0.0	0.0	0.0	0.0
Wood & Paper	-0.3	-0.5	-0.5	0.2	0.4	0.5
Printing & Publishing	-0.2	-0.4	-0.4	0.0	0.1	0.1
Manufactured Fuels	-2.9	-3.3	-4.6	-1.9	-2.5	-3.5
Pharmaceuticals	0.0	0.0	0.0	0.0	0.0	0.0
Other Chemicals	0.0	-0.1	-0.1	0.0	-0.1	-0.1
Rubber & Plastics	0.1	0.2	0.3	0.2	0.4	0.5
Non-Metallic Mineral Products	0.0	0.0	0.0	0.1	0.1	0.2
Basic Metals	0.2	0.6	1.0	0.7	1.3	1.9

Metal Goods	0.1	1.2	1.5	-0.2	0.6	1.6
Mechanical Engineering	0.7	1.3	1.7	0.7	1.2	1.7
Electronics	0.0	0.0	0.0	0.0	0.0	0.0
Electrical Engineering	0.0	0.0	0.0	0.0	0.0	0.0
Motor Vehicles	0.1	-0.9	-0.8	0.8	1.4	2.0
Other Transport Equipment	-0.2	-0.5	-0.6	0.0	0.0	0.1
Other Manufacturing	0.1	0.2	0.3	0.1	0.2	0.3
Total Manufacturing	0.1	0.1	0.2	0.2	0.4	0.7

Canada employment, % difference to baseline

	TIAM-ECN_CT40	TIAM-ECN_CT70	TIAM-ECN_CT100	POLES_ct40	POLES_ct70	POLES_ct100
Food, Drink & Tobacco	-0.5	-0.4	-0.7	0.1	0.1	0.1
Textiles, Clothing & Leather	0.0	0.0	0.0	0.0	0.0	0.0
Wood & Paper	0.0	0.0	0.0	0.1	0.1	0.1
Printing & Publishing	0.0	0.2	0.1	0.1	0.2	0.2
Manufactured Fuels	-2.0	-6.7	-6.3	-1.7	-2.7	-3.7
Pharmaceuticals	-0.1	-0.2	-0.3	0.3	0.3	0.4
Other Chemicals	-0.2	-0.3	-0.3	-0.1	-0.2	-0.2
Rubber & Plastics	0.2	0.4	0.3	0.5	0.7	0.8
Non-Metallic Mineral Products	-0.2	-0.1	-0.4	0.1	0.2	0.2
Basic Metals	0.7	1.8	2.1	0.8	1.2	1.9
Metal Goods	2.3	3.0	3.6	1.2	1.8	2.1
Mechanical Engineering	1.0	1.1	1.2	0.7	1.0	1.3
Electronics	0.1	0.4	0.4	0.5	0.8	1.1
Electrical Engineering	-0.5	-0.4	-0.4	-0.3	-0.4	-0.4
Motor Vehicles	0.4	3.7	3.8	0.7	1.1	1.5
Other Transport Equipment	0.4	1.7	1.5	0.3	0.5	0.7
Other Manufacturing	-0.1	0.4	0.3	0.5	0.8	1.0
Total Manufacturing	0.3	0.8	0.8	0.4	0.5	0.7

Australia employment, % difference to baseline

	TIAM-ECN_CT40	TIAM-ECN_CT70	TIAM-ECN_CT100	POLES_ct40	POLES_ct70	POLES_ct100
Food, Drink & Tobacco	0.0	0.1	0.1	0.0	0.0	-0.1
Textiles, Clothing & Leather	0.0	0.0	0.0	0.0	0.0	0.0
Wood & Paper	-0.3	-0.6	-0.7	-0.1	-0.2	-0.2
Printing & Publishing	0.0	0.0	0.0	0.0	0.0	0.0
Manufactured Fuels	-0.1	-0.1	-0.1	0.0	-0.1	-0.1
Pharmaceuticals	0.0	0.0	0.1	0.0	0.0	0.0
Other Chemicals	-0.1	-0.2	-0.2	-0.1	-0.1	-0.1
Rubber & Plastics	0.0	0.0	0.0	0.0	0.0	0.0

Non-Metallic Mineral Products	-0.4	-0.9	-1.1	-0.4	-0.6	-0.7
Basic Metals	-0.1	-0.3	-0.4	0.0	0.0	0.0
Metal Goods	-0.9	-1.7	-2.0	-0.3	-0.5	-0.6
Mechanical Engineering	8.7	17.9	22.8	2.5	4.1	5.0
Electronics	0.0	0.0	0.0	0.0	0.0	0.0
Electrical Engineering	0.2	-0.2	-0.4	0.3	0.5	0.6
Motor Vehicles	-0.1	-0.3	-0.4	0.0	0.0	-0.1
Other Transport Equipment	-0.1	-0.3	-0.3	0.0	0.0	0.0
Other Manufacturing	-0.4	0.4	0.8	-0.3	-0.4	-0.5
Total Manufacturing	0.5	1.1	1.4	0.1	0.2	0.2

Russia employment, % difference to baseline

	TIAM-ECN_CT40	TIAM-ECN_CT70	TIAM-ECN_CT100	POLES_ct40	POLES_ct70	POLES_ct100
Food, Drink & Tobacco	0.0	0.0	0.0	0.0	0.0	0.0
Textiles, Clothing & Leather	0.0	0.0	0.0	0.0	0.0	0.0
Wood & Paper	0.4	0.7	0.8	0.1	0.1	0.2
Printing & Publishing	0.4	1.0	1.2	0.1	0.2	0.3
Manufactured Fuels	0.1	0.1	0.1	-0.3	-0.4	-0.5
Pharmaceuticals	0.0	0.1	0.4	0.5	0.5	0.7
Other Chemicals	0.2	-1.3	-1.5	1.4	2.3	3.1
Rubber & Plastics	-0.2	-0.1	0.0	0.0	0.0	0.1
Non-Metallic Mineral Products	0.0	0.0	0.0	0.0	0.0	0.0
Basic Metals	0.0	0.0	0.0	0.0	0.0	0.0
Metal Goods	-0.3	0.3	0.9	0.6	0.9	1.1
Mechanical Engineering	-0.6	0.7	1.3	1.3	1.7	2.0
Electronics	-0.3	1.1	1.7	2.1	3.2	4.1
Electrical Engineering	0.4	0.9	1.3	0.3	0.6	0.8
Motor Vehicles	-0.3	-0.3	-0.9	0.0	0.1	0.1
Other Transport Equipment	-0.1	0.0	-0.1	0.2	0.3	0.4
Other Manufacturing	-0.4	-0.8	-1.0	0.0	0.1	0.3
Total Manufacturing	-0.1	0.2	0.3	0.4	0.6	0.7

China employment, % difference to baseline

	TIAM-ECN_CT40	TIAM-ECN_CT70	TIAM-ECN_CT100	POLES_ct40	POLES_ct70	POLES_ct100
Food, Drink & Tobacco	0.0	0.0	0.0	0.0	0.0	0.0
Textiles, Clothing & Leather	-0.1	-0.3	-0.2	0.1	0.1	0.1
Wood & Paper	0.2	0.9	0.9	0.8	1.2	1.3
Printing & Publishing	0.0	0.5	0.5	0.4	0.6	0.6
Manufactured Fuels	-0.2	-0.4	-0.5	-0.1	-0.1	-0.2
Pharmaceuticals	0.0	0.0	0.0	0.0	0.0	0.0

Other Chemicals	0.0	0.0	0.0	0.0	0.0	0.0
Rubber & Plastics	0.1	0.5	0.5	0.4	0.6	0.7
Non-Metallic Mineral Products	0.5	1.2	1.2	0.5	0.7	0.7
Basic Metals	0.5	0.9	0.9	0.4	0.6	0.6
Metal Goods	-0.5	0.7	1.3	2.0	2.7	3.8
Mechanical Engineering	-0.3	-0.4	-0.4	0.2	0.4	0.3
Electronics	-0.3	-0.4	-0.3	0.3	0.4	0.3
Electrical Engineering	0.1	0.3	0.3	0.2	0.3	0.3
Motor Vehicles	0.0	0.0	0.0	0.0	0.0	0.0
Other Transport Equipment	-0.3	-0.7	-0.1	0.2	0.5	0.5
Other Manufacturing	0.0	0.0	0.0	0.0	0.0	0.0
Total Manufacturing	0.0	0.2	0.2	0.3	0.4	0.4

India employment, % difference to baseline

	TIAM-ECN_CT40	TIAM-ECN_CT70	TIAM-ECN_CT100	POLES_ct40	POLES_ct70	POLES_ct100
Food, Drink & Tobacco	0.0	0.0	0.0	0.0	0.0	0.0
Textiles, Clothing & Leather	0.7	1.5	2.0	-0.1	0.4	0.8
Wood & Paper	0.2	0.2	0.1	0.1	0.1	0.0
Printing & Publishing	0.7	1.1	1.4	0.5	0.8	1.0
Manufactured Fuels	-0.9	-2.4	-3.2	0.0	-0.4	-0.9
Pharmaceuticals	0.0	0.0	0.0	0.0	0.0	0.0
Other Chemicals	0.0	0.1	0.1	0.1	0.2	0.2
Rubber & Plastics	-0.9	-1.3	-1.8	-0.1	-0.5	-0.7
Non-Metallic Mineral Products	-0.4	-0.6	-0.7	-0.1	-0.3	-0.5
Basic Metals	0.9	2.2	2.8	1.0	1.6	2.0
Metal Goods	-0.2	-0.1	-0.2	1.5	3.0	3.1
Mechanical Engineering	0.2	1.1	1.4	0.5	1.2	1.1
Electronics	0.2	0.4	0.5	-0.1	0.0	0.0
Electrical Engineering	0.2	7.5	10.0	7.7	16.2	14.9
Motor Vehicles	0.4	2.4	2.7	0.6	-0.1	-0.3
Other Transport Equipment	0.0	-2.1	-3.2	-1.2	-2.3	-3.2
Other Manufacturing	0.1	0.2	0.3	-0.1	-0.1	-0.1
Total Manufacturing	0.3	0.7	0.9	0.2	0.5	0.5

Brazil employment, % difference to baseline

	TIAM-ECN_CT40	TIAM-ECN_CT70	TIAM-ECN_CT100	POLES_ct40	POLES_ct70	POLES_ct100
Food, Drink & Tobacco	0.0	0.0	0.0	0.0	0.0	0.0
Textiles, Clothing & Leather	0.1	0.2	0.2	0.2	0.3	0.5
Wood & Paper	-0.1	-0.1	-0.1	0.0	0.1	0.1
Printing & Publishing	0.1	0.2	0.3	0.1	0.1	0.2

Manufactured Fuels	-0.3	-4.9	-5.2	-2.0	-3.1	-4.2
Pharmaceuticals	0.0	0.0	0.0	0.0	0.0	0.0
Other Chemicals	0.0	0.0	0.1	0.0	0.0	0.0
Rubber & Plastics	0.0	0.5	0.6	0.1	0.3	0.4
Non-Metallic Mineral Products	0.0	-0.2	-0.2	0.0	-0.1	-0.1
Basic Metals	0.1	0.3	0.4	0.0	0.1	0.2
Metal Goods	0.9	4.4	6.0	0.8	1.3	1.9
Mechanical Engineering	0.9	3.2	4.3	0.7	1.1	1.5
Electronics	-0.1	-0.1	-0.2	-0.1	-0.1	0.0
Electrical Engineering	0.1	0.4	0.6	0.1	0.1	0.2
Motor Vehicles	-0.1	-0.1	0.1	0.3	0.6	0.9
Other Transport Equipment	0.0	0.4	0.4	0.3	0.5	0.7
Other Manufacturing	0.0	0.1	0.1	0.1	0.1	0.2
Total Manufacturing	0.1	0.5	0.7	0.2	0.3	0.4

Mexico employment, % difference to baseline

	TIAM-ECN_CT40	TIAM-ECN_CT70	TIAM-ECN_CT100	POLES_ct40	POLES_ct70	POLES_ct100
Food, Drink & Tobacco	-0.4	-0.6	-0.8	0.0	0.0	0.0
Textiles, Clothing & Leather	0.0	0.0	0.0	0.0	0.0	0.0
Wood & Paper	-0.2	0.1	-0.1	0.2	0.5	0.6
Printing & Publishing	-0.3	-3.7	-4.4	0.7	1.1	1.4
Manufactured Fuels	-0.9	-1.8	-2.2	-1.1	-1.8	-2.5
Pharmaceuticals	0.0	-0.1	-0.2	0.0	0.0	0.0
Other Chemicals	-0.5	-1.8	-2.2	0.1	0.2	0.2
Rubber & Plastics	0.3	-2.8	-3.2	1.3	2.0	2.4
Non-Metallic Mineral Products	0.0	0.0	0.0	0.0	0.0	0.0
Basic Metals	-0.6	-0.9	-1.2	0.1	0.0	0.0
Metal Goods	0.8	0.4	0.6	0.6	0.9	1.2
Mechanical Engineering	5.8	3.3	3.8	3.0	4.6	5.6
Electronics	0.0	0.0	-0.1	0.0	0.0	0.0
Electrical Engineering	0.0	0.0	0.0	0.0	0.1	0.1
Motor Vehicles	0.1	0.3	0.3	0.2	0.2	0.3
Other Transport Equipment	-0.5	-8.8	-9.3	1.5	2.5	3.3
Other Manufacturing	-0.1	-0.8	-1.0	0.5	0.7	0.9
Total Manufacturing	0.7	-0.4	-0.5	0.7	1.1	1.3

Argentina employment, % difference to baseline

	TIAM-ECN_CT40	TIAM-ECN_CT70	TIAM-ECN_CT100	POLES_ct40	POLES_ct70	POLES_ct100
Food, Drink & Tobacco	0.0	0.0	0.0	0.0	0.0	0.0
Textiles, Clothing & Leather	-0.1	-0.1	0.0	0.4	0.5	0.6

Wood & Paper	0.0	-0.1	-0.1	0.0	0.0	0.0
Printing & Publishing	-0.1	0.0	0.0	0.3	0.5	0.6
Manufactured Fuels	-0.8	-5.5	-6.3	-2.7	-5.1	-7.4
Pharmaceuticals	0.0	0.0	0.0	0.2	0.3	0.3
Other Chemicals	-0.2	-0.3	-0.3	0.0	-0.1	-0.1
Rubber & Plastics	-0.3	0.0	0.5	0.5	0.7	1.0
Non-Metallic Mineral Products	-0.6	-0.6	-0.6	0.7	1.2	1.6
Basic Metals	-0.6	-1.2	-1.4	-0.2	-0.3	-0.1
Metal Goods	-1.2	-1.1	0.8	0.8	1.4	2.0
Mechanical Engineering	4.4	8.3	10.4	3.5	6.2	6.2
Electronics	-1.6	1.0	2.5	3.8	5.8	7.7
Electrical Engineering	-2.8	3.1	19.8	12.8	20.0	26.7
Motor Vehicles	-0.7	-2.8	-2.9	2.7	4.3	5.8
Other Transport Equipment	-0.6	-2.3	-2.3	2.3	3.7	5.0
Other Manufacturing	-0.3	-0.6	-0.8	-0.1	-0.1	-0.1
Total Manufacturing	-0.1	0.1	0.9	1.0	1.6	2.1

Republic of Korea employment, % difference to baseline

	TIAM-ECN_CT40	TIAM-ECN_CT70	TIAM-ECN_CT100	POLES_ct40	POLES_ct70	POLES_ct100
Food, Drink & Tobacco	0.0	0.0	0.0	0.0	0.0	0.0
Textiles, Clothing & Leather	0.0	0.1	0.4	0.1	0.2	0.2
Wood & Paper	0.0	0.0	0.0	0.0	0.0	0.0
Printing & Publishing	-0.1	0.4	1.0	0.5	0.8	1.0
Manufactured Fuels	-0.4	-1.2	-1.6	-0.8	-1.1	-1.4
Pharmaceuticals	0.0	0.0	0.0	0.0	0.0	0.0
Other Chemicals	0.0	0.0	0.0	0.0	0.0	0.0
Rubber & Plastics	0.2	0.6	2.1	0.5	0.7	0.9
Non-Metallic Mineral Products	0.0	0.0	0.0	0.0	0.0	0.0
Basic Metals	0.5	1.1	2.2	0.9	1.3	1.5
Metal Goods	1.5	2.2	4.8	1.2	1.9	1.9
Mechanical Engineering	0.0	0.0	0.0	0.0	0.0	0.0
Electronics	0.2	0.4	0.8	0.6	0.7	0.8
Electrical Engineering	0.1	0.3	1.1	0.3	0.5	0.5
Motor Vehicles	0.0	-0.2	0.1	0.4	0.5	0.7
Other Transport Equipment	0.0	0.0	0.0	0.0	0.0	0.0
Other Manufacturing	0.3	0.5	1.5	0.1	0.3	0.5
Total Manufacturing	0.2	0.3	0.9	0.3	0.4	0.5

Indonesia employment, % difference to baseline

	TIAM-ECN_CT40	TIAM-ECN_CT70	TIAM-ECN_CT100	POLES_ct40	POLES_ct70	POLES_ct100

Food, Drink & Tobacco	0.0	0.0	0.0	0.0	0.0	0.0
Textiles, Clothing & Leather	-0.6	-0.9	-1.2	-0.1	-0.1	0.0
Wood & Paper	-0.3	-0.7	-0.8	-0.5	-0.4	-0.3
Printing & Publishing	1.4	2.2	3.2	1.5	1.7	1.9
Manufactured Fuels	0.7	1.3	1.2	0.1	0.0	0.1
Pharmaceuticals	-0.2	-0.2	-0.3	-0.2	-0.1	-0.1
Other Chemicals	-0.1	-0.2	-0.2	-0.1	-0.1	-0.1
Rubber & Plastics	-0.1	0.0	-0.1	-0.1	-0.1	-0.1
Non-Metallic Mineral Products	-0.4	-0.6	-0.5	-0.1	0.2	0.5
Basic Metals	0.1	0.2	0.7	0.1	0.3	0.5
Metal Goods	0.2	-0.8	-1.5	-0.3	-0.8	-1.1
Mechanical Engineering	0.4	2.0	3.4	0.8	1.5	2.2
Electronics	-0.2	-0.4	-0.1	0.3	0.5	0.7
Electrical Engineering	0.7	1.6	2.8	1.2	1.9	2.5
Motor Vehicles	-0.2	-0.5	-0.6	-0.3	-0.3	-0.2
Other Transport Equipment	-0.1	-0.1	-0.1	0.3	0.9	1.4
Other Manufacturing	0.1	0.4	0.9	0.1	0.6	1.0
Total Manufacturing	-0.1	-0.2	-0.2	-0.1	0.0	0.1

Proxy for Saudi Arabia (OPEC) employment, % difference to baseline

	TIAM-ECN_CT40	TIAM-ECN_CT70	TIAM-ECN_CT100	POLES_ct40	POLES_ct70	POLES_ct100
Food, Drink & Tobacco	-1.0	-1.4	-1.5	-0.5	-0.6	-0.8
Textiles, Clothing & Leather	0.0	0.1	0.1	0.2	0.2	0.2
Wood & Paper	-0.5	-0.4	0.2	1.8	3.0	4.5
Printing & Publishing	-0.4	-0.6	-0.7	0.5	0.8	0.8
Manufactured Fuels	0.1	0.1	0.1	-0.5	-0.8	-1.2
Pharmaceuticals	-0.3	-0.6	-0.7	0.3	0.3	0.4
Other Chemicals	0.1	0.2	0.2	-0.1	-0.2	-0.3
Rubber & Plastics	-0.8	-0.8	-0.8	1.2	1.9	2.4
Non-Metallic Mineral Products	-0.2	-0.1	0.1	0.3	0.5	0.7
Basic Metals	0.0	0.2	0.3	0.6	1.0	1.3
Metal Goods	0.5	0.7	0.8	-0.1	-0.3	-0.5
Mechanical Engineering	0.2	0.2	0.0	-0.4	-0.6	-0.7
Electronics	1.4	1.9	2.9	-1.6	-2.6	-3.3
Electrical Engineering	-0.1	1.3	2.4	2.1	3.0	4.0
Motor Vehicles	0.1	-0.6	-0.4	0.3	0.6	0.7
Other Transport Equipment	-0.5	-2.1	-2.1	1.2	1.9	2.2
Other Manufacturing	-0.8	-0.9	-0.7	1.4	2.2	3.0
Total Manufacturing	-0.2	-0.2	0.0	0.4	0.6	0.8

Proxy for South Africa (RoW) employment, % difference to baseline

	TIAM-ECN_CT40	TIAM-ECN_CT70	TIAM-ECN_CT100	POLES_ct40	POLES_ct70	POLES_ct100
Food, Drink & Tobacco	-1.8	-2.8	-3.3	-0.8	-0.9	-0.8
Textiles, Clothing & Leather	0.0	-0.1	0.0	0.1	0.2	0.3
Wood & Paper	-0.4	-0.9	-1.9	-1.2	-1.3	-1.5
Printing & Publishing	0.0	-0.2	-0.2	0.0	0.1	0.1
Manufactured Fuels	0.0	0.0	0.0	0.0	0.0	0.0
Pharmaceuticals	0.1	0.2	0.3	0.0	0.0	0.0
Other Chemicals	0.0	0.0	0.0	0.0	0.0	0.0
Rubber & Plastics	0.2	-0.8	-0.7	0.5	0.7	0.9
Non-Metallic Mineral Products	-1.3	-5.0	-8.0	-2.2	-2.9	-3.2
Basic Metals	-0.3	-0.1	-0.2	-0.1	-0.1	0.0
Metal Goods	0.0	0.0	0.0	0.0	0.0	0.0
Mechanical Engineering	0.0	0.0	0.0	0.0	0.0	0.0
Electronics	0.0	-0.1	0.0	0.1	0.3	0.4
Electrical Engineering	0.0	0.0	0.0	0.0	0.0	0.0
Motor Vehicles	0.1	1.0	1.0	0.0	0.0	0.0
Other Transport Equipment	-0.1	-0.8	-0.6	0.1	0.2	0.4
Other Manufacturing	0.0	-0.1	-0.1	0.0	0.0	0.0
Total Manufacturing	-0.3	-0.6	-0.9	-0.2	-0.2	-0.2

World employment, % difference to baseline

	TIAM-ECN_CT40	TIAM-ECN_CT70	TIAM-ECN_CT100	POLES_ct40	POLES_ct70	POLES_ct100
Food, Drink & Tobacco	-0.3	-0.5	-0.5	-0.1	-0.1	-0.1
Textiles, Clothing & Leather	0.2	0.2	0.4	0.0	0.2	0.3
Wood & Paper	0.0	0.1	-0.1	0.1	0.2	0.3
Printing & Publishing	0.2	0.4	0.5	0.3	0.5	0.6
Manufactured Fuels	0.2	0.1	0.2	0.0	0.0	0.0
Pharmaceuticals	0.0	0.0	0.0	0.0	0.0	0.1
Other Chemicals	0.0	0.0	0.0	0.1	0.1	0.1
Rubber & Plastics	0.2	0.2	0.3	0.5	0.7	0.8
Non-Metallic Mineral Products	-0.1	-0.4	-0.8	0.0	0.0	0.0
Basic Metals	0.4	0.8	1.0	0.4	0.6	0.7
Metal Goods	0.3	0.7	1.0	0.6	1.0	1.2
Mechanical Engineering	0.4	0.5	0.8	0.4	0.6	0.7
Electronics	0.0	0.1	0.2	0.3	0.4	0.4
Electrical Engineering	0.1	0.5	0.8	0.4	0.7	0.7
Motor Vehicles	0.1	0.3	0.3	0.2	0.2	0.2
Other Transport Equipment	-0.1	-0.7	-0.6	0.1	0.3	0.4
Other Manufacturing	0.0	0.0	0.0	0.1	0.2	0.3
Total Manufacturing	0.1	0.1	0.2	0.2	0.3	0.4

Source(s): E3ME, Cambridge Econometrics.

C.5 Manufacturing employment in 2050

European Union employment, % difference to baseline

	TIAM-ECN_CT40	TIAM-ECN_CT70	TIAM-ECN_CT100	POLES_ct40	POLES_ct70	POLES_ct100
Food, Drink & Tobacco	0.0	0.1	0.2	0.0	0.0	0.0
Textiles, Clothing & Leather	0.0	0.1	0.3	0.2	0.3	0.4
Wood & Paper	0.0	0.2	0.1	-0.1	-0.2	-0.2
Printing & Publishing	0.0	0.3	0.2	0.3	0.4	0.5
Manufactured Fuels	1.4	2.9	3.4	0.9	1.7	2.5
Pharmaceuticals	0.0	-0.3	-0.4	0.1	0.1	0.2
Other Chemicals	0.1	0.3	0.5	0.4	0.5	0.6
Rubber & Plastics	0.1	0.3	0.4	0.2	0.3	0.4
Non-Metallic Mineral Products	0.1	0.4	0.6	1.5	2.2	2.7
Basic Metals	0.0	-0.2	-0.1	0.7	1.2	1.5
Metal Goods	0.7	1.3	1.7	1.1	1.6	1.9
Mechanical Engineering	-0.4	-0.6	-0.6	0.6	0.8	1.0
Electronics	0.0	0.2	0.4	0.6	0.7	0.8
Electrical Engineering	0.1	0.1	0.2	0.6	0.8	1.0
Motor Vehicles	0.1	0.1	0.2	0.1	0.2	0.2
Other Transport Equipment	0.2	0.3	0.3	0.5	0.8	1.2
Other Manufacturing	-0.2	-0.4	-0.4	-0.3	-0.4	-0.4
Total Manufacturing	0.1	0.2	0.3	0.4	0.5	0.6

Germany employment, % difference to baseline

	TIAM-ECN_CT40	TIAM-ECN_CT70	TIAM-ECN_CT100	POLES_ct40	POLES_ct70	POLES_ct100
Food, Drink & Tobacco	0.1	0.1	0.2	0.0	0.0	0.0
Textiles, Clothing & Leather	0.2	0.4	0.6	0.6	0.9	1.0
Wood & Paper	0.0	-0.1	0.1	0.5	0.7	0.9
Printing & Publishing	-0.2	0.0	0.1	0.0	0.0	-0.1
Manufactured Fuels	-6.8	-8.1	-11.5	-5.3	-7.2	-8.6
Pharmaceuticals	0.5	0.3	0.5	0.5	0.7	0.9
Other Chemicals	0.0	0.0	0.1	0.1	0.1	0.1
Rubber & Plastics	0.0	0.0	0.0	0.0	0.0	0.0
Non-Metallic Mineral Products	1.6	2.2	3.7	5.5	8.0	9.9
Basic Metals	0.1	0.0	0.0	0.7	0.9	1.2
Metal Goods	-0.1	-0.2	-0.3	0.0	0.0	0.0
Mechanical Engineering	-0.4	-0.8	-0.9	0.2	0.2	0.2
Electronics	0.1	0.3	0.4	0.0	0.0	0.1
Electrical Engineering	-1.0	-1.9	-2.4	-0.2	-0.4	-0.6
Motor Vehicles	0.0	0.0	0.0	0.0	0.0	0.0

Other Transport Equipment	0.0	0.0	0.0	0.0	0.0	0.0
Other Manufacturing	0.0	-0.1	-0.2	0.3	0.4	0.5
Total Manufacturing	-0.1	-0.2	-0.2	0.2	0.2	0.3

France employment, % difference to baseline

	TIAM-ECN_CT40	TIAM-ECN_CT70	TIAM-ECN_CT100	POLES_ct40	POLES_ct70	POLES_ct100
Food, Drink & Tobacco	0.4	0.8	0.7	-0.1	-0.1	-0.1
Textiles, Clothing & Leather	2.3	3.8	5.1	2.9	4.2	5.3
Wood & Paper	-0.1	-0.4	-1.0	-1.9	-2.5	-2.9
Printing & Publishing	0.8	1.5	2.1	0.9	1.3	1.6
Manufactured Fuels	-7.9	-9.0	-11.6	-9.6	-12.1	-13.9
Pharmaceuticals	0.0	0.0	0.0	0.0	0.0	0.0
Other Chemicals	0.5	0.7	1.2	2.4	2.8	3.2
Rubber & Plastics	0.2	0.4	0.4	-0.1	-0.2	-0.2
Non-Metallic Mineral Products	-0.1	-0.3	-0.9	-1.2	-1.7	-2.1
Basic Metals	-0.4	-0.9	-1.3	-0.9	-0.8	-0.8
Metal Goods	0.1	0.0	-0.1	-0.2	-0.2	-0.3
Mechanical Engineering	-0.1	-0.1	0.0	0.7	0.9	1.0
Electronics	0.0	-0.1	-0.1	-0.2	-0.2	-0.2
Electrical Engineering	0.1	0.4	0.5	0.3	0.4	0.4
Motor Vehicles	0.7	1.2	0.7	-0.3	-0.3	-0.4
Other Transport Equipment	0.2	-1.0	-1.8	0.1	-0.2	-0.2
Other Manufacturing	-0.1	-0.3	-0.5	-0.6	-0.8	-0.9
Total Manufacturing	0.1	0.1	0.0	-0.2	-0.2	-0.3

Italy employment, % difference to baseline

	TIAM-ECN_CT40	TIAM-ECN_CT70	TIAM-ECN_CT100	POLES_ct40	POLES_ct70	POLES_ct100
Food, Drink & Tobacco	0.0	0.0	0.0	0.0	0.0	0.0
Textiles, Clothing & Leather	0.2	0.6	0.7	-0.3	-0.5	-0.6
Wood & Paper	0.2	0.3	0.4	0.1	0.2	0.3
Printing & Publishing	2.0	4.4	6.1	3.3	5.0	6.2
Manufactured Fuels	-0.8	-1.0	-1.3	-0.3	-0.5	-0.6
Pharmaceuticals	0.0	0.0	0.1	0.0	0.0	0.0
Other Chemicals	0.1	0.2	0.3	0.0	-0.1	-0.1
Rubber & Plastics	0.1	0.3	0.5	0.3	0.4	0.5
Non-Metallic Mineral Products	0.0	0.0	0.1	0.1	0.1	0.1
Basic Metals	-0.4	-0.8	-1.1	-0.5	-0.7	-0.8
Metal Goods	3.0	5.7	7.2	3.4	5.0	6.2
Mechanical Engineering	-1.7	-3.1	-3.5	-0.9	-0.9	-1.1
Electronics	0.2	0.5	0.6	0.3	0.4	0.5

Electrical Engineering	0.0	0.0	-0.1	-0.1	-0.1	-0.2
Motor Vehicles	-0.3	-0.3	-0.1	0.0	0.1	0.1
Other Transport Equipment	0.8	1.6	1.9	1.2	1.8	2.4
Other Manufacturing	0.0	-0.1	-0.1	0.0	0.0	-0.1
Total Manufacturing	0.3	0.6	0.8	0.4	0.7	0.9

United Kingdom employment, % difference to baseline

	TIAM-ECN_CT40	TIAM-ECN_CT70	TIAM-ECN_CT100	POLES_ct40	POLES_ct70	POLES_ct100
Food, Drink & Tobacco	-0.2	-0.2	-0.1	-0.1	-0.1	-0.2
Textiles, Clothing & Leather	-1.2	-1.9	-1.8	0.2	0.4	1.8
Wood & Paper	0.2	0.5	0.6	0.4	0.6	0.7
Printing & Publishing	0.3	0.1	-0.8	-0.3	-0.6	-0.8
Manufactured Fuels	-10.7	-14.7	-20.7	-11.5	-17.8	-22.2
Pharmaceuticals	-0.9	-2.5	-3.2	0.7	0.8	0.9
Other Chemicals	-0.1	-0.1	0.2	0.1	0.1	0.1
Rubber & Plastics	0.1	0.2	0.4	0.4	0.5	0.6
Non-Metallic Mineral Products	-0.5	-1.2	-0.9	1.8	2.3	2.8
Basic Metals	-0.5	-1.4	-1.6	0.1	0.1	0.2
Metal Goods	-2.5	-4.5	-5.5	-1.8	-2.7	-3.5
Mechanical Engineering	-0.4	-0.8	-0.2	1.3	1.7	1.8
Electronics	-0.6	0.6	2.5	5.4	6.6	7.5
Electrical Engineering	-0.7	-1.0	-1.6	-1.3	-1.7	-2.1
Motor Vehicles	0.2	0.0	-0.2	0.0	-0.1	-0.2
Other Transport Equipment	0.0	0.0	0.0	0.0	0.0	0.0
Other Manufacturing	0.2	0.3	0.3	0.2	0.2	0.3
Total Manufacturing	-0.4	-0.7	-0.8	0.1	0.0	0.0

Turkey employment, % difference to baseline

	TIAM-ECN_CT40	TIAM-ECN_CT70	TIAM-ECN_CT100	POLES_ct40	POLES_ct70	POLES_ct100
Food, Drink & Tobacco	0.0	0.0	0.0	0.0	0.1	0.1
Textiles, Clothing & Leather	0.8	0.8	1.2	1.2	1.8	2.2
Wood & Paper	0.0	0.0	0.0	0.0	0.0	0.0
Printing & Publishing	0.2	-0.1	-0.2	-0.1	-0.1	-0.2
Manufactured Fuels	-0.7	-1.0	-2.1	-0.4	-0.8	-1.1
Pharmaceuticals	0.0	0.0	0.0	0.0	0.0	0.0
Other Chemicals	0.0	0.0	0.1	0.0	0.0	0.0
Rubber & Plastics	0.1	0.2	0.2	0.2	0.3	0.3
Non-Metallic Mineral Products	0.2	0.4	0.3	1.0	1.7	2.2
Basic Metals	0.3	0.5	0.6	0.9	1.4	1.8
Metal Goods	1.4	2.6	3.2	1.5	2.2	2.8

Mechanical Engineering	0.0	0.0	0.0	0.0	0.0	0.0
Electronics	0.0	0.0	0.0	0.0	0.0	0.0
Electrical Engineering	0.0	0.1	0.1	0.1	0.1	0.2
Motor Vehicles	0.0	0.0	0.0	0.0	0.0	0.0
Other Transport Equipment	0.0	0.0	0.0	0.0	0.0	0.0
Other Manufacturing	-0.1	-0.1	-0.2	0.1	0.1	0.1
Total Manufacturing	0.3	0.4	0.5	0.4	0.6	0.8

United States employment, % difference to baseline

	TIAM-ECN_CT40	TIAM-ECN_CT70	TIAM-ECN_CT100	POLES_ct40	POLES_ct70	POLES_ct100
Food, Drink & Tobacco	0.4	0.6	0.3	0.0	0.0	0.0
Textiles, Clothing & Leather	0.9	1.4	1.6	0.4	0.5	0.7
Wood & Paper	0.3	0.4	0.3	0.0	0.0	0.0
Printing & Publishing	1.1	1.5	2.2	0.2	0.3	0.5
Manufactured Fuels	-0.6	-0.8	-0.9	-0.3	-0.4	-0.5
Pharmaceuticals	0.0	0.0	-0.1	0.3	0.5	0.6
Other Chemicals	0.6	0.9	1.0	0.3	0.4	0.4
Rubber & Plastics	0.6	1.0	1.1	0.4	0.6	0.7
Non-Metallic Mineral Products	0.0	0.0	-0.2	0.0	0.0	0.0
Basic Metals	-4.7	-6.4	-11.1	-3.4	-5.3	-6.9
Metal Goods	-1.1	-1.2	-1.5	0.5	0.5	0.3
Mechanical Engineering	0.3	0.2	0.4	0.9	1.2	1.3
Electronics	0.4	0.7	0.6	1.2	2.0	2.5
Electrical Engineering	-0.1	-0.1	-0.3	0.4	0.6	0.6
Motor Vehicles	0.0	0.0	0.0	0.0	0.0	0.0
Other Transport Equipment	0.1	0.2	0.2	0.1	0.2	0.3
Other Manufacturing	-0.2	-0.3	-0.3	0.1	0.1	0.2
Total Manufacturing	0.0	0.1	0.0	0.2	0.3	0.3

Japan employment, % difference to baseline

	TIAM-ECN_CT40	TIAM-ECN_CT70	TIAM-ECN_CT100	POLES_ct40	POLES_ct70	POLES_ct100
Food, Drink & Tobacco	-0.3	-0.5	-0.7	-0.1	-0.1	-0.1
Textiles, Clothing & Leather	0.0	0.0	0.0	0.0	0.0	0.0
Wood & Paper	-0.5	-1.2	-1.7	0.1	0.2	0.2
Printing & Publishing	0.0	-0.1	-0.3	0.2	0.2	0.3
Manufactured Fuels	-5.6	-6.9	-10.3	-11.3	-15.3	-17.8
Pharmaceuticals	0.0	0.0	0.0	0.0	0.0	0.0
Other Chemicals	-0.1	-0.1	-0.2	-0.1	-0.1	-0.2
Rubber & Plastics	0.1	0.3	0.4	0.3	0.4	0.5
Non-Metallic Mineral Products	0.0	-0.2	-0.5	0.5	0.7	0.9

Basic Metals	0.6	1.1	2.0	1.2	1.4	1.6
Metal Goods	1.0	0.9	0.6	1.7	2.0	2.5
Mechanical Engineering	2.2	3.6	3.9	1.7	2.0	2.3
Electronics	0.0	0.0	0.0	0.0	0.0	0.0
Electrical Engineering	0.0	0.0	0.0	0.0	0.0	0.0
Motor Vehicles	0.7	-2.4	-1.4	4.5	6.7	8.9
Other Transport Equipment	-0.1	-0.3	-0.5	0.0	0.1	0.1
Other Manufacturing	0.1	0.2	0.3	0.3	0.5	0.6
Total Manufacturing	0.3	0.1	0.1	0.8	1.1	1.5

Canada employment, % difference to baseline

	TIAM-ECN_CT40	TIAM-ECN_CT70	TIAM-ECN_CT100	POLES_ct40	POLES_ct70	POLES_ct100
Food, Drink & Tobacco	-0.2	-0.2	-0.1	0.1	0.1	0.1
Textiles, Clothing & Leather	0.0	0.0	0.0	0.0	0.0	0.0
Wood & Paper	0.0	0.1	0.1	0.1	0.1	0.2
Printing & Publishing	0.0	0.1	0.1	0.2	0.3	0.4
Manufactured Fuels	-0.6	-0.9	-1.6	-1.5	-2.4	-3.1
Pharmaceuticals	-0.2	-0.6	-0.6	0.7	1.0	1.3
Other Chemicals	-0.2	-0.3	-0.5	0.0	0.0	0.0
Rubber & Plastics	0.0	0.2	0.3	0.4	0.6	0.7
Non-Metallic Mineral Products	0.0	-0.2	-0.2	0.5	0.9	1.3
Basic Metals	-0.1	-0.2	-0.1	1.1	1.4	1.8
Metal Goods	2.7	3.3	3.8	2.1	2.9	3.5
Mechanical Engineering	-0.6	-0.8	-0.7	0.2	0.3	0.3
Electronics	-0.1	0.0	0.2	0.7	1.0	1.4
Electrical Engineering	-1.4	-1.6	-2.0	-0.8	-1.2	-1.4
Motor Vehicles	0.9	1.0	1.0	1.3	2.2	3.1
Other Transport Equipment	-0.6	-2.0	-2.5	0.3	0.6	0.9
Other Manufacturing	-0.3	-0.4	-0.5	0.3	0.4	0.5
Total Manufacturing	0.2	0.3	0.3	0.5	0.7	1.0

Australia employment, % difference to baseline

	TIAM-ECN_CT40	TIAM-ECN_CT70	TIAM-ECN_CT100	POLES_ct40	POLES_ct70	POLES_ct100
Food, Drink & Tobacco	0.0	0.1	0.1	0.0	0.0	0.0
Textiles, Clothing & Leather	0.0	0.0	0.0	0.0	0.0	0.0
Wood & Paper	-0.1	-0.1	-0.3	-0.1	-0.1	-0.1
Printing & Publishing	0.0	0.0	0.0	0.0	0.0	0.0
Manufactured Fuels	0.0	-0.1	-0.1	0.0	0.0	-0.1
Pharmaceuticals	0.0	0.0	0.1	0.0	0.0	0.1
Other Chemicals	-0.1	-0.2	-0.3	-0.1	-0.1	-0.2

Rubber & Plastics	0.0	0.0	0.0	0.0	0.0	0.0
Non-Metallic Mineral Products	-0.5	-0.6	-0.8	-0.7	-1.1	-1.4
Basic Metals	-0.4	-0.4	-0.4	-0.3	-0.3	-0.4
Metal Goods	-1.1	-1.3	-1.5	-0.4	-0.5	-0.6
Mechanical Engineering	16.2	18.9	21.5	6.8	8.9	10.4
Electronics	0.0	0.0	0.0	0.0	0.0	0.0
Electrical Engineering	-0.3	-0.3	-0.4	-0.1	-0.2	-0.2
Motor Vehicles	-0.1	-0.1	-0.2	0.0	-0.1	-0.1
Other Transport Equipment	-0.3	-0.9	-1.8	-0.4	-0.5	-0.7
Other Manufacturing	0.6	0.5	0.6	0.2	0.2	0.2
Total Manufacturing	1.6	1.8	2.0	0.7	0.9	1.0

Russia employment, % difference to baseline

	TIAM-ECN_CT40	TIAM-ECN_CT70	TIAM-ECN_CT100	POLES_ct40	POLES_ct70	POLES_ct100
Food, Drink & Tobacco	0.0	0.0	0.0	0.0	0.0	0.0
Textiles, Clothing & Leather	0.0	0.0	0.0	0.0	0.0	0.0
Wood & Paper	0.3	0.3	0.3	-0.1	-0.1	-0.1
Printing & Publishing	0.4	0.4	0.4	0.3	0.4	0.4
Manufactured Fuels	-0.3	-0.4	-0.6	-0.3	-0.4	-0.5
Pharmaceuticals	0.2	1.0	1.5	1.7	2.3	2.6
Other Chemicals	-1.4	-16.2	-17.6	-0.1	0.7	1.9
Rubber & Plastics	0.2	0.2	0.3	0.0	-0.1	0.0
Non-Metallic Mineral Products	0.0	0.0	0.0	0.0	0.0	0.0
Basic Metals	0.0	0.0	0.0	0.0	0.0	0.0
Metal Goods	0.7	1.6	2.2	1.0	1.3	1.6
Mechanical Engineering	1.4	3.4	3.8	2.1	2.7	3.1
Electronics	1.7	3.2	4.2	3.5	4.9	6.0
Electrical Engineering	0.8	1.2	1.7	0.3	0.6	0.9
Motor Vehicles	0.3	0.3	-0.5	0.3	0.5	0.6
Other Transport Equipment	0.1	0.1	0.1	0.6	0.8	1.0
Other Manufacturing	0.6	0.8	1.3	0.3	0.4	0.5
Total Manufacturing	0.4	0.3	0.4	0.6	0.8	1.0

China employment, % difference to baseline

	TIAM-ECN_CT40	TIAM-ECN_CT70	TIAM-ECN_CT100	POLES_ct40	POLES_ct70	POLES_ct100
Food, Drink & Tobacco	0.0	0.0	0.0	0.0	0.0	0.0
Textiles, Clothing & Leather	0.0	-0.2	-0.2	0.0	0.0	0.0
Wood & Paper	1.7	3.8	4.0	1.4	2.0	2.7
Printing & Publishing	0.6	1.2	1.3	0.2	0.3	0.4
Manufactured Fuels	-0.2	-0.4	-0.5	-0.1	-0.1	-0.2

Pharmaceuticals	0.0	0.0	0.0	0.0	0.0	0.0
Other Chemicals	0.0	0.0	0.0	0.0	0.0	0.0
Rubber & Plastics	0.6	1.1	1.2	0.1	0.2	0.2
Non-Metallic Mineral Products	0.7	1.4	1.6	0.7	1.1	1.6
Basic Metals	-0.1	0.2	0.5	0.2	0.2	0.4
Metal Goods	4.0	13.9	14.8	9.3	13.2	14.5
Mechanical Engineering	0.1	0.2	0.0	0.0	0.0	0.2
Electronics	0.6	0.5	0.5	-0.1	0.0	0.2
Electrical Engineering	0.2	0.6	0.8	0.3	0.4	0.5
Motor Vehicles	-0.1	0.0	0.0	0.0	0.1	0.1
Other Transport Equipment	0.7	-0.1	-0.2	0.0	0.2	0.3
Other Manufacturing	0.0	0.0	0.0	0.0	0.0	0.0
Total Manufacturing	0.4	0.8	0.9	0.3	0.5	0.6

India employment, % difference to baseline

	TIAM-ECN_CT40	TIAM-ECN_CT70	TIAM-ECN_CT100	POLES_ct40	POLES_ct70	POLES_ct100
Food, Drink & Tobacco	0.0	0.0	0.0	0.0	0.0	0.0
Textiles, Clothing & Leather	1.7	2.3	3.3	0.1	0.6	1.2
Wood & Paper	-0.2	-0.2	-0.2	0.1	0.1	0.0
Printing & Publishing	0.6	0.9	1.4	0.2	0.6	0.9
Manufactured Fuels	-1.0	-1.7	-3.2	-1.6	-1.9	-2.4
Pharmaceuticals	0.0	0.0	0.0	0.0	0.0	0.0
Other Chemicals	0.2	0.5	0.5	0.2	0.2	0.3
Rubber & Plastics	0.7	1.8	1.6	1.1	1.4	1.3
Non-Metallic Mineral Products	2.6	2.8	2.8	0.1	-0.1	-0.7
Basic Metals	1.1	2.2	2.5	1.1	1.5	1.9
Metal Goods	-0.2	1.4	1.6	-1.1	-1.3	-2.0
Mechanical Engineering	-0.1	2.0	2.8	1.7	1.7	2.3
Electronics	-0.1	0.2	0.7	0.8	0.9	1.3
Electrical Engineering	-3.6	12.1	19.6	11.7	12.4	15.8
Motor Vehicles	0.1	-0.4	-2.7	0.3	0.4	-0.3
Other Transport Equipment	1.0	0.9	-1.8	0.6	-0.5	-1.7
Other Manufacturing	0.1	0.1	0.2	0.1	0.2	0.3
Total Manufacturing	0.8	1.3	1.7	0.2	0.4	0.4

Brazil employment, % difference to baseline

	TIAM-ECN_CT40	TIAM-ECN_CT70	TIAM-ECN_CT100	POLES_ct40	POLES_ct70	POLES_ct100
Food, Drink & Tobacco	0.0	0.0	0.0	0.0	0.0	0.0
Textiles, Clothing & Leather	0.0	0.0	0.0	0.2	0.4	0.6
Wood & Paper	0.0	0.2	0.2	0.1	0.0	0.0

Printing & Publishing	0.1	0.1	0.0	0.1	0.4	0.6
Manufactured Fuels	-1.9	-2.5	-2.9	-2.4	-3.6	-4.6
Pharmaceuticals	0.1	0.1	0.2	0.0	0.1	0.1
Other Chemicals	0.0	0.0	0.0	0.0	0.0	0.0
Rubber & Plastics	0.1	0.2	0.0	0.1	0.3	0.5
Non-Metallic Mineral Products	0.2	-0.1	0.7	0.1	0.2	0.3
Basic Metals	0.1	0.1	0.0	0.0	0.2	0.4
Metal Goods	1.6	3.0	3.5	1.2	2.0	2.9
Mechanical Engineering	1.7	3.1	3.6	1.1	1.8	2.5
Electronics	-0.2	-0.3	-0.4	-0.3	-0.3	-0.3
Electrical Engineering	-0.1	-0.2	-0.4	-0.1	-0.1	-0.1
Motor Vehicles	0.2	0.2	1.1	0.7	1.5	2.2
Other Transport Equipment	-0.2	0.0	-0.9	-0.2	0.0	0.2
Other Manufacturing	0.0	-0.1	-0.2	0.0	0.0	0.0
Total Manufacturing	0.2	0.4	0.5	0.2	0.4	0.6

Mexico employment, % difference to baseline

	TIAM-ECN_CT40	TIAM-ECN_CT70	TIAM-ECN_CT100	POLES_ct40	POLES_ct70	POLES_ct100
Food, Drink & Tobacco	-0.2	-0.3	-0.4	0.0	-0.1	-0.1
Textiles, Clothing & Leather	0.0	0.0	0.0	0.0	0.0	0.0
Wood & Paper	0.0	0.9	2.0	1.4	1.7	1.9
Printing & Publishing	-1.1	-1.8	1.3	0.2	0.3	0.6
Manufactured Fuels	-2.9	-3.9	-11.4	-2.6	-4.1	-5.3
Pharmaceuticals	0.0	0.1	0.1	0.0	0.0	0.1
Other Chemicals	-0.7	-0.9	0.5	-0.1	-0.1	-0.1
Rubber & Plastics	0.6	-0.2	4.3	1.2	2.1	2.7
Non-Metallic Mineral Products	0.0	0.0	0.0	0.0	0.0	0.0
Basic Metals	0.0	0.4	0.4	0.1	0.0	0.1
Metal Goods	0.9	0.4	0.5	0.5	0.8	1.0
Mechanical Engineering	-1.6	-2.2	4.2	1.3	2.6	2.4
Electronics	0.0	0.0	-0.1	0.0	-0.1	-0.1
Electrical Engineering	0.0	0.0	0.0	0.0	0.0	0.0
Motor Vehicles	0.2	-0.2	-0.3	0.4	0.7	0.8
Other Transport Equipment	-3.5	-3.9	10.3	-0.2	0.2	0.7
Other Manufacturing	0.8	0.3	1.8	1.0	1.6	2.2
Total Manufacturing	-0.2	-0.5	1.8	0.5	1.0	1.1

Argentina employment, % difference to baseline

	TIAM-ECN_CT40	TIAM-ECN_CT70	TIAM-ECN_CT100	POLES_ct40	POLES_ct70	POLES_ct100
Food, Drink & Tobacco	0.0	0.0	0.0	0.0	0.0	0.0

Textiles, Clothing & Leather	-0.1	0.0	-0.1	0.4	0.5	0.6
Wood & Paper	-0.1	-0.1	-0.1	0.0	0.0	0.0
Printing & Publishing	-0.1	0.0	0.0	0.1	0.1	0.2
Manufactured Fuels	-3.3	-3.3	-5.8	-4.4	-7.2	-9.4
Pharmaceuticals	-0.1	-0.1	-0.1	0.6	0.8	1.0
Other Chemicals	-0.3	-0.5	-0.6	-0.4	-0.6	-0.8
Rubber & Plastics	0.2	1.1	2.3	0.9	1.4	1.9
Non-Metallic Mineral Products	0.0	0.1	0.0	-0.1	-0.2	-0.2
Basic Metals	-0.8	-1.2	-0.5	1.1	1.6	1.9
Metal Goods	-1.0	-0.2	2.0	0.8	1.2	1.5
Mechanical Engineering	-0.2	3.3	5.7	2.5	3.6	5.9
Electronics	3.0	4.8	6.7	8.9	14.8	20.4
Electrical Engineering	3.1	19.2	49.3	10.2	15.6	21.1
Motor Vehicles	2.2	-2.5	-7.8	6.4	10.9	15.0
Other Transport Equipment	0.0	0.8	-1.8	0.7	1.4	1.9
Other Manufacturing	-0.6	-1.0	-1.0	-0.2	-0.2	-0.5
Total Manufacturing	0.3	0.9	2.0	1.5	2.4	3.3

Republic of Korea employment, % difference to baseline

	TIAM-ECN_CT40	TIAM-ECN_CT70	TIAM-ECN_CT100	POLES_ct40	POLES_ct70	POLES_ct100
Food, Drink & Tobacco	0.0	0.0	0.0	0.0	0.0	0.0
Textiles, Clothing & Leather	0.2	0.4	0.2	0.2	0.4	0.5
Wood & Paper	0.0	0.0	0.0	0.0	0.0	0.0
Printing & Publishing	0.7	0.9	0.9	0.0	-0.1	0.0
Manufactured Fuels	-0.5	-1.8	-2.7	-1.2	-1.7	-2.0
Pharmaceuticals	0.0	0.0	0.0	0.0	0.0	0.0
Other Chemicals	0.0	0.0	0.0	0.0	0.0	0.0
Rubber & Plastics	0.8	1.7	1.9	0.6	1.0	1.3
Non-Metallic Mineral Products	0.0	0.0	0.0	0.0	0.0	0.0
Basic Metals	1.3	2.2	2.4	1.3	1.8	2.4
Metal Goods	3.0	9.9	12.6	4.6	6.4	8.1
Mechanical Engineering	0.0	0.0	0.0	0.0	0.0	0.0
Electronics	1.0	1.7	2.1	1.7	2.4	3.0
Electrical Engineering	0.4	0.6	0.5	0.4	0.5	0.7
Motor Vehicles	0.2	0.4	0.5	0.6	0.9	1.2
Other Transport Equipment	0.0	0.0	0.0	0.0	0.0	0.0
Other Manufacturing	-0.8	0.6	-0.3	0.3	0.1	0.5
Total Manufacturing	0.5	1.2	1.4	0.7	1.0	1.3

Indonesia employment, % difference to baseline

	TIAM-ECN_CT40	TIAM-ECN_CT70	TIAM-ECN	POLES_ct40	POLES_ct70	POLES_ct100

			_CT10 0			
Food, Drink & Tobacco	0.0	0.0	0.0	0.0	0.0	0.0
Textiles, Clothing & Leather	-0.6	-0.8	-1.6	0.7	1.0	1.2
Wood & Paper	-0.4	-0.8	-1.0	-1.0	-0.6	-0.2
Printing & Publishing	0.9	1.0	2.4	2.3	2.9	3.5
Manufactured Fuels	-0.6	-1.0	-0.7	0.5	0.4	0.3
Pharmaceuticals	0.3	0.4	0.5	-0.6	-0.4	-0.2
Other Chemicals	0.0	-0.1	0.0	-0.4	-0.2	0.0
Rubber & Plastics	0.3	0.6	0.4	0.0	0.0	0.0
Non-Metallic Mineral Products	-0.4	-0.8	-0.8	-0.7	-0.1	0.5
Basic Metals	3.3	4.2	6.2	1.6	2.8	3.8
Metal Goods	-3.0	-4.5	-4.4	0.5	0.2	0.0
Mechanical Engineering	10.1	12.5	13.2	0.7	2.2	3.6
Electronics	0.1	-0.2	0.1	0.5	0.8	1.2
Electrical Engineering	1.5	2.4	2.0	1.3	1.1	0.8
Motor Vehicles	-0.2	-0.9	-0.8	-0.9	-0.7	-0.6
Other Transport Equipment	0.5	0.5	0.4	-0.5	-0.3	0.0
Other Manufacturing	2.6	3.4	4.5	-0.6	0.1	0.8
Total Manufacturing	0.1	0.0	0.0	-0.1	0.1	0.4

Proxy for Saudi Arabia (OPEC) employment, % difference to baseline

	TIAM-ECN _CT40	TIAM-ECN _CT70	TIAM-ECN _CT10 0	POLES _ct40	POLES _ct70	POLES _ct100
Food, Drink & Tobacco	-1.9	-3.3	-4.0	-0.1	-0.1	-0.3
Textiles, Clothing & Leather	0.1	0.1	0.2	1.2	1.5	1.6
Wood & Paper	-2.9	-4.6	-3.8	4.6	6.6	7.5
Printing & Publishing	0.1	0.3	0.6	0.6	0.9	0.9
Manufactured Fuels	-0.9	-1.2	-14.7	-7.7	-8.0	-8.0
Pharmaceuticals	-0.8	-2.1	-2.1	0.6	0.8	0.8
Other Chemicals	0.5	0.7	0.5	-0.4	-0.7	-0.8
Rubber & Plastics	-0.4	-0.1	2.5	1.7	2.3	2.4
Non-Metallic Mineral Products	-0.4	-0.5	-0.3	1.5	2.3	3.0
Basic Metals	-0.1	0.3	1.3	0.7	1.1	1.3
Metal Goods	2.3	4.0	3.3	-0.7	-1.0	-1.0
Mechanical Engineering	1.2	2.2	1.8	-1.9	-2.8	-3.3
Electronics	2.1	2.2	0.3	-1.2	-1.4	-1.0
Electrical Engineering	1.6	2.6	3.7	2.8	4.3	6.0
Motor Vehicles	0.6	0.0	-0.5	0.3	0.6	0.9
Other Transport Equipment	-0.5	-0.1	-0.8	0.1	0.1	-0.1
Other Manufacturing	-1.7	-3.4	-2.6	2.2	3.0	3.0
Total Manufacturing	-0.2	-0.5	-0.3	0.9	1.3	1.5

Proxy for South Africa (RoW) employment, % difference to baseline

	TIAM-ECN_CT40	TIAM-ECN_CT70	TIAM-ECN_CT100	POLES_ct40	POLES_ct70	POLES_ct100
Food, Drink & Tobacco	0.2	1.4	2.3	-0.2	-0.5	-0.9
Textiles, Clothing & Leather	0.0	0.0	0.2	0.3	0.2	0.4
Wood & Paper	-0.1	1.6	-1.8	-1.1	-1.9	-2.9
Printing & Publishing	0.1	-0.5	-0.8	-0.5	-0.8	-1.0
Manufactured Fuels	0.0	0.0	0.0	0.0	0.0	0.0
Pharmaceuticals	-0.1	-0.7	-1.2	0.0	0.0	0.0
Other Chemicals	0.0	0.0	0.0	0.0	0.0	0.0
Rubber & Plastics	0.1	-3.0	-2.9	0.3	0.4	0.4
Non-Metallic Mineral Products	-2.5	-4.7	-6.3	0.5	0.8	1.0
Basic Metals	0.1	0.1	0.5	0.3	0.3	0.4
Metal Goods	0.0	0.0	0.0	0.0	0.0	0.0
Mechanical Engineering	0.0	0.0	0.0	0.0	0.0	0.0
Electronics	0.3	-0.4	-1.5	0.1	0.1	0.1
Electrical Engineering	0.0	0.0	0.0	0.0	0.0	0.0
Motor Vehicles	0.1	-0.2	0.2	0.3	0.4	0.6
Other Transport Equipment	0.0	-0.1	-0.3	0.1	0.1	0.2
Other Manufacturing	-0.2	-0.4	-0.5	-0.1	-0.1	-0.1
Total Manufacturing	-0.1	-0.2	-0.5	0.0	-0.1	-0.2

World employment, % difference to baseline

	TIAM-ECN_CT40	TIAM-ECN_CT70	TIAM-ECN_CT100	POLES_ct40	POLES_ct70	POLES_ct100
Food, Drink & Tobacco	0.0	0.2	0.3	0.0	-0.1	-0.2
Textiles, Clothing & Leather	0.4	0.5	0.8	0.1	0.2	0.4
Wood & Paper	0.2	0.9	0.4	0.4	0.7	0.8
Printing & Publishing	0.4	0.7	0.9	0.2	0.3	0.4
Manufactured Fuels	-0.1	0.0	-0.4	-0.1	0.0	0.0
Pharmaceuticals	0.0	-0.2	-0.2	0.1	0.1	0.2
Other Chemicals	0.0	-0.3	-0.3	0.0	0.0	0.1
Rubber & Plastics	0.6	0.7	1.2	0.5	0.7	0.9
Non-Metallic Mineral Products	0.5	0.5	0.4	0.5	0.8	0.9
Basic Metals	0.1	0.4	0.6	0.3	0.4	0.6
Metal Goods	0.8	2.3	2.5	1.1	1.7	1.9
Mechanical Engineering	0.5	0.9	1.2	0.5	0.6	0.8
Electronics	0.6	0.6	0.6	0.3	0.5	0.7
Electrical Engineering	0.2	0.9	1.2	0.6	0.7	0.9
Motor Vehicles	0.2	-0.2	-0.3	0.4	0.6	0.8
Other Transport Equipment	0.0	0.0	0.2	0.3	0.4	0.4
Other Manufacturing	0.0	-0.1	0.0	0.2	0.3	0.4
Total Manufacturing	0.3	0.5	0.7	0.3	0.5	0.6

Source(s): E3ME, Cambridge Econometrics.