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ASEAN FOOD AND  
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**FIA** FOOD  
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ASIA



# CLIMATE CHANGE AND FOOD PRICES IN SOUTHEAST ASIA

**2024 UPDATE**







# TABLE OF CONTENTS

|   |    |
|---|----|
| <b>Executive Summary</b>  | 4  |
| <b>1. Introduction</b>  | 8  |
| <b>2. Impact of climate change on food prices in Southeast Asia</b> | 10 |
| 2.1 Introduction  | 10 |
| 2.2 Climate change and food bills                                   | 11 |
| 2.3 Costs of energy transition                                      | 13 |
| <b>3. Domestic policies to mitigate the impact</b>                  | 18 |
| 3.1 Introduction  | 18 |
| 3.2 A golden opportunity to tap global FDI                          | 19 |
| 3.3 Policy options to maximise the benefits of FDI                  | 20 |
| <b>4. International cooperation to ease the cost of transition</b>  | 24 |
| 4.1 Introduction  | 24 |
| 4.2 ASEAN's growing importance for global development               | 24 |
| 4.3 How can international cooperation help?                         | 26 |
| <b>5. Conclusion: Call to action</b>                                | 28 |

# EXECUTIVE SUMMARY

**1%–2%**



Every 1% increase in the average temperature raises food producer prices by 1-2% across ASEAN countries.

In 2022, Oxford Economics and Food Industry Asia published our first joint report on climate change and food prices in ASEAN countries. Since its publication, the issue of climate change and food production prices has become more urgent and gained considerable interest in the region. For example, the Asian Development Bank has since warned of hikes in food prices and household expenditure in Asia should the knock-on effects of climate change mitigation policies not be adequately managed.

## PHYSICAL AND TRANSITION RISKS FROM CLIMATE CHANGE WOULD HAVE SUBSTANTIAL IMPACTS ON FOOD PRICES IN ASEAN

This new report finds that physical risks from climate change have driven up food prices across the region. We extend our previous analysis estimating the impact of climate change on the cost of food production to a longer time frame. For example, our analysis for Thailand uses historical data spreading across the last 29 years.

We find that a 1% increase in the average temperature raises food producer prices by 1-2% across Thailand, Vietnam, Malaysia, Indonesia, and the Philippines. Within that group, the Philippines is the most vulnerable to temperature changes due to its geographical vulnerability to extreme weather events and the weaker ability of food production system to respond to these events. We estimate that climate change in the past decade was responsible for a 6% increase in food prices in the Philippines, over and above what would otherwise have occurred.

The transition to low-carbon economy, while necessary and unavoidable for global development, will also create substantial impacts on food bills. In particular, the transition will push up the cost of energy, labour, and other input to the food manufacturing and distribution processes. Such disruptions will be pronounced in ASEAN countries where the energy system remains highly dependent on fossil fuels. In this report, we build upon our previous modelling exercise of not only identifying the cost of extreme weather patterns but also by quantifying the implications of Southeast Asia's energy transition for food prices since this is a trend that will only accelerate in the region.

Our analysis suggest that food production costs would rise by 31%-59% in a scenario in which the world achieves net zero emissions by 2050, compared to the current baseline (in which credibly announced policies are carried through). Among ASEAN countries, food prices in Indonesia are the most exposed, owing to the high fossil fuel dependence and vulnerability to rising global food prices.

**6%**



Periods of rising temperature in the past decade have added as much as 6% to the producer cost of food in the Philippines and can be expected to occur more frequently.

**31%–59%**



Increase food production costs in ASEAN, associated with achieving the net zero transition by 2050.

## A RENEWED CALL FOR ASEAN GOVERNMENTS AND FOOD INDUSTRY TO JOINTLY TACKLE THE IMPACT TO FOOD COSTS

**The impact of physical and transition risks on food prices calls for ASEAN governments to protect consumers and ease the impact of the climate transition.** Food price spikes caused by extreme weather events cause real hardship for poorer households, who spend around 10% more of their income on food than the average household. It also reduces the competitiveness of local industries. Policymakers may consider reallocating public funds towards climate-smart agriculture and prioritising welfare spending and social assistance among poor and vulnerable households. ASEAN governments may also ease the costs of transition for the food manufacturing sector through infrastructure investment (especially in renewable energy), encouraging private investments into the food sector, and supporting innovation to increase productivity.

**At the same time, the current global and regional economic context creates new opportunities and challenges in implementing these policies.** ASEAN governments now face limited fiscal space for more public spending due to the higher burden of debt servicing and relatively weak recovery in public revenue following the Covid-19 pandemic. At the same time, the reconfiguration of global supply chains is creating a golden opportunity to place ASEAN's food production system on a more sustainable footing. In 2022, the region accounted for a third (36%) of global foreign direct investment (FDI) inflows, up from 26% in 2012.

**In this context, we reiterate our call for ASEAN governments to work with the food industry in the region to strengthen the integration of FDI firms into domestic economies.**

ASEAN governments can further attract foreign investments in the food sector by addressing regulatory barriers related to foreign equity. Policy focus must go beyond FDI attraction to FDI retention. This entails ensuring a fair and level playing field, keeping an open trade regime, and proactively providing administrative, operational, and strategic assistance to existing investors. At the same time, governments can strengthen domestic industries through investment in climate smart agriculture, capacity-building programmes, and improving the quality infrastructure for standard setting, certification, and accreditation.

# 36%

ASEAN's share of global FDI, up from 26% in 2009-11, reflecting the region's increasing importance in global supply chain reconfiguration.



# 7.5%

Only 7.5% of local firms in ASEAN have an internationally-recognised quality certification, compared to 34.9% among foreign firms in the region.



23%

Share of total food imports into LDCs accounted for by ASEAN producers—up from 14% in 2000.



**AN EXTENDED CALL TO GLOBAL COMMUNITY TO SUPPORT ASEAN GOVERNMENTS AND INDUSTRY IN MITIGATING TRANSITION RISKS**

**At the same time, there is a strong case for global cooperation to ease the cost of transition for ASEAN food sector.** The share of global food imports accounted by ASEAN producers has increased from 6.6% in 2000 to 9.1% in 2021. In particular, 23% of the total food imports of least developed countries (LDCs) is derived from the ASEAN region. Due to the ASEAN’s integral position in global supply chains, a spike in regional food prices may also indirectly push up inflation and fuel another cost-of-living crisis across global markets, especially in the more vulnerable, less developed nations.

**We extend our call to governments across the world to support ASEAN governments and food industry in easing the impact of energy transition on food production costs in ASEAN.** Donors and multilateral institutions can help with providing financial support, unlocking investments, and sharing technical expertise in climate-resilient agriculture and food production. New global environmental policies and standards can also be more inclusive with an increased consultation with ASEAN stakeholders.

**COP28 underscored the inevitability of the energy transition, and ASEAN governments recognise the need to contribute their fair share.** Yet, this study highlights the local and global impact of doing so, through the lens of food market across ASEAN. We urge governments in ASEAN and worldwide to collaborate closely with the food industry to develop and implement strategies that effectively address the challenges of rising food production cost in the years ahead.

# THE PRICE OF FOOD IN SOUTHEAST ASIA



Climate change and transition to net zero will push up food prices in ASEAN

## What are the physical risks of climate change?



Every **1% increase** in the average temperature raises food producer prices by **1%-2%**.



The Philippines has been the **most vulnerable**. In the last decade, rising temperature increased the cost of producing food by **an additional 6%**.

## What are the risks of energy transition?

Achieving global net zero emissions by 2050 could increase the cost of food production across ASEAN countries by **31%-59%**.

**Indonesia faces the highest risk**, due to its fossil fuel dependence and vulnerability to rising global food prices.

2050 producer food prices, % differences, net zero compared to baseline

|             |     |
|-------------|-----|
| Indonesia   | 59% |
| Vietnam     | 51% |
| Malaysia    | 39% |
| Thailand    | 32% |
| Philippines | 31% |

## We renew and extend our call to governments in the region and across the world



### 1 Global cooperation to ease cost of transition

A spike in ASEAN food prices affects global food security and cost-of-living

The share of global food imports sourced from ASEAN has increased from **6.6%** in 2000 to **9.1%** in 2021.

Governments across the world can work with ASEAN governments and industry to...

- Unlock investments in climate-resilient agriculture
- Provide financial & technical expertise in energy transition
- Involve ASEAN governments and industry in global dialogue



### 2 Further integrate FDI firms into domestic economies

ASEAN is facing a golden moment to upgrade

ASEAN accounted for **36%** of global FDI inflows in 2022, up from **26%** in 2012.

ASEAN governments can work with industry to...

- Reduce regulatory barriers to FDI entry
- Retain existing investors through open trade regime and fair competition
- Invest in productive capacity of local producers



# 1. INTRODUCTION

**The cost of food production in ASEAN has trended upward in the past two years**, due to the twin factors of the Russia-Ukraine conflict and extreme weather events. The Russian invasion of Ukraine brought disruptions to food supply chains from the two major global grain exporters. ASEAN's significant exposure to commodities such as wheat from both countries meant producer food prices in the region were vulnerable to the supply shortage. Furthermore, food-related export restrictions imposed by countries around the world amidst fear for domestic supplies exacerbated the situation.

**Since mid-2023, the impacts of El Niño and other extreme weather events on food inflation have gained traction in the media and public discourse.** Record-high temperatures in countries like Thailand and Vietnam have severely threatened food production in the region's

key agricultural areas. This sent the prices of some food, especially rice, skyrocketing in ASEAN as domestic supplies dwindled and protectionist policies kicked in from major exporters like India. With adverse climatic events expected to be more common in the near future, the impact on food security and inflation is beginning to become more widely understood not only in ASEAN, but also across broader Asia. In particular, the Asian Development Bank (2023)<sup>1</sup> has warned of hikes in food prices and household expenditure in Asia should the knock-on effects of climate change mitigation policies not be adequately managed.

**Rising food prices compounded the challenges for economic policymakers.** They came at a particularly inopportune time for ASEAN nations, where a structural dependence on export revenues meant economies were already grappling with

a global demand slowdown. Rising inflation, partly driven by surging food costs, and rising interest rates in the US also posed a monetary policy dilemma to ASEAN central bankers, who faced the challenge of containing inflation whilst maintaining a stable currency. Meanwhile, the rising cost of living threatens to derail hard-won development gains and push vulnerable populations deeper into poverty.

**In this report, we expand upon our 2022 study of the impact of climate change on Southeast Asian food prices (OE/FIA, 2022) across several dimensions.** Firstly, we extend and update our econometric model to evaluate the impact of climate change on food prices over extended periods. Secondly, we expand the modelling exercise to assess the cost of energy transition on food prices by 2050 for all five ASEAN countries. These two quantitative analyses are

<sup>1</sup><https://www.adb.org/publications/asian-development-outlook-april-2023>



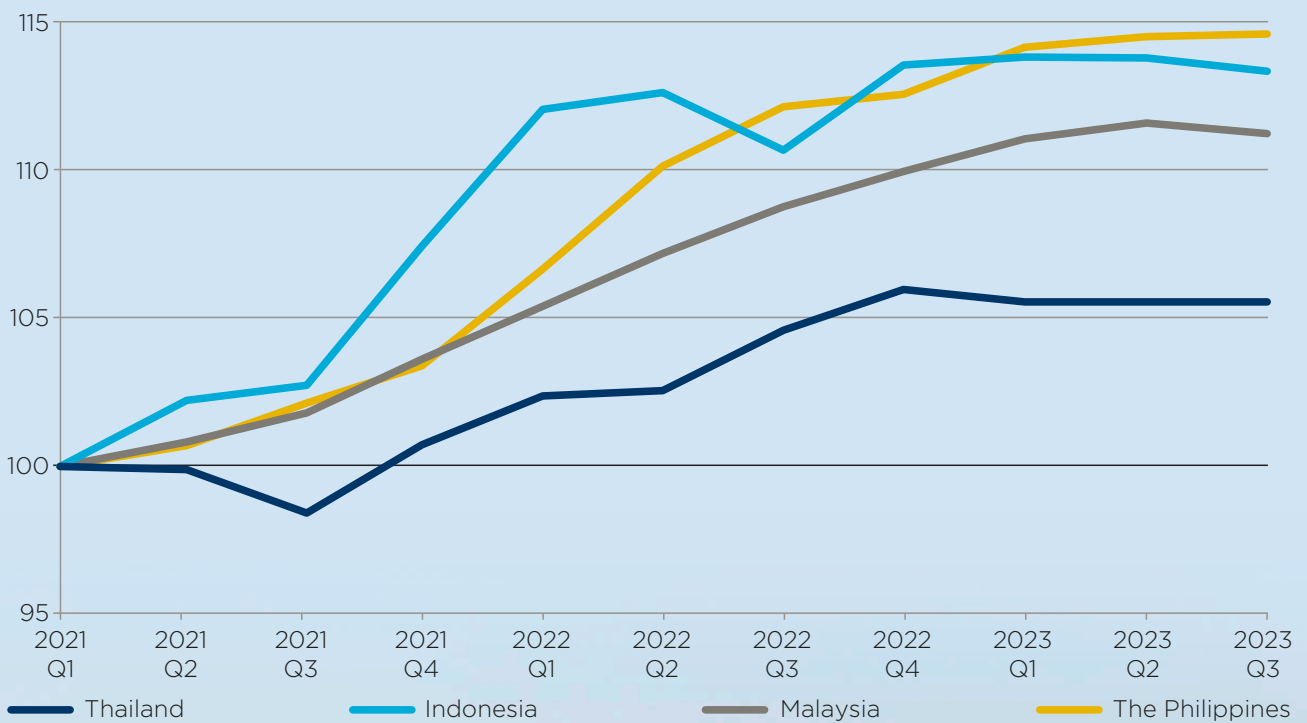


covered in section 2. Thirdly, we deepen the policy discussion by focusing on the opportunity and challenges in unlocking the benefits of rising foreign direct investments (FDIs) into

ASEAN countries; this is in section 3. We then frame the challenges of rising food prices in ASEAN as a key issue for global development, and make the case for global cooperation

in ensuring a smooth transition for the sector. Finally, in section 5, the report concludes with a call to action for governments at both national, regional, and international level.

**Figure 1: Index of producer food prices across ASEAN countries, 2021-present (2021 Q1=100)**



Source: Oxford Economics/Haver Analytics



# 2. IMPACT OF CLIMATE CHANGE ON FOOD PRICES IN SOUTHEAST ASIA

## KEY INSIGHTS

- Food prices in Asia are vulnerable to upward pressure from the physical risks of climate change. We find that a 1% increase in average temperature raises food producer prices by 1-2% across the five ASEAN countries (Thailand, Vietnam, Malaysia, Indonesia, and the Philippines) over a 29-year period.
- The Philippines has been the ASEAN country most vulnerable to climate change in recent years, owing to its greater sensitivity to physical risks such as increased frequency of typhoons and hurricanes, and larger rises in temperature. Our estimates suggest that rising temperature in the past decade increased producer food prices in the Philippines by an additional 6.0%.
- The risks associated with the energy transition also pose an upside risk to the cost of food production. A successful energy transition to achieve net zero emissions by 2050 is associated with a 30.8%-58.9% increase in food prices, over and above our stated-policy baseline (where current commitments are followed through at global level). Indonesia faces the highest risk, driven by its heavy reliance on fossil fuels and susceptibility to global food price hikes.

## 2.1 INTRODUCTION

Our analysis of the impact of climate change on food prices in ASEAN in this report builds upon and advances our original assessment in our 2022 study in three ways:

- We ascertain the validity of our findings regarding the climate change impact over a longer period. Specifically, we incorporate a longer time series (up to 29 years) to assess the impact. This timeframe is capped by the availability of historical data.
- The longer observed period also increases the statistical power of the model such that we are now able to incorporate the Philippines in the analysis.

Our modelling also shows the impact of the climate transition on food production cost by 2050 across all five countries. This draws from

the recent development of Oxford Economics' Global Climate Scenario, which has increased its geographic coverage in recent years.

**Table 1: Time frame for econometric impact analysis, original edition vs. 2024 update**

|                    | Impact of climate change on food price |                      | Cost of energy transition |             |
|--------------------|--|----------------------|---------------------------|-------------|
|                    | Original edition                       | 2024 update          | Original edition          | 2024 update |
| <b>Thailand</b>    | 14 years (2008-2021)                   | 29 years (1995-2023) | -                         | ✓           |
| <b>Vietnam</b>     | 12 years (2009-2020)                   | 23 years (2000-2022) | -                         | ✓           |
| <b>Malaysia</b>    | 13 years (2009-21)                     | 19 years (2005-2023) | -                         | ✓           |
| <b>Indonesia</b>   | 9 years (2013-21)                      | 11 years (2013-2023) | ✓                         | ✓           |
| <b>Philippines</b> | N/A                                    | 12 years (2012-2023) | -                         | ✓           |

Source: Oxford Economics



## 2.2 CLIMATE CHANGE AND FOOD BILLS

For the purpose of this study, we have updated our econometric analysis to ascertain the impacts of climate change on food bills over a longer time period. Depending on the availability of data (especially the quarterly series on producer food price across countries that are produced by national statistics office), we extend the time frame of analysis backward up to 1995 in Thailand. We also benefit from two additional years of data since the last publication. Taken together, the analysis now includes a period of 11 to 29 years, depending on the specific countries (see Table 1).

We are also able to leverage the extended time series to incorporate results for the Philippines. To accommodate the change, we made several adjustments to our econometric models in order to ensure their explanatory power remains strong across the period (see box below).

**The updated results confirm the validity of the previous econometric analysis in our 2022 report.** Across all countries, we find that climate change has a statistically significant impact in pushing producer food prices upwards.

Regarding the effect of climate change, the long-run equations quantify the impact on prices of changes in average temperature and average rainfall (both defined as rolling four quarter averages).

### USING AN ERROR-CORRECTION MECHANISM TO MODEL THE IMPACT OF CLIMATE ON FOOD PRICES—METHODOLOGY AND UPDATE

Our econometric estimation of the drivers of producer prices for food products uses an error-correction model (ECM). In the long run, the cost of producing food depends on the price of various inputs to the production process, including agricultural commodities, energy and transportation, and labour. In the short term, prices charged by food producers may deviate from this long-run relationship due to transitory shocks such as sudden swings in input costs.

The ECM captures this dynamic by using the deviation in prices from the long-run trend as an input to the price inflation equation. The coefficient on the ECM term shows how much of the difference is narrowed each

period—e.g., a coefficient of -0.5 indicates that if prices are 10% below where they should be on a fundamental basis, they will rise by 5% in the next period. Box 1 in OE/FIA (2022) provides a detailed discussion of the methodology.

In this report, we made several improvements to the model. In particular, we re-evaluate the inclusion of cost drivers to ensure the statistical validity of the regression model when using the extended time series. This revision also helps to ensure the indicators used for the cost drivers are also covered in the Global Climate Scenario modelling exercise.

**Table 2: Econometric drivers of food producer prices**

|  |                                      | IDN     | MYS     | PHL     | THA      | VNM     |
|--|--------------------------------------|---------|---------|---------|----------|---------|
| <b>Long-run equation: impact on price levels</b>         | Average temperature                  | 2.00*   | 1.40*   | 2.17*   | 1.31***  | 0.96*   |
|  | Average rainfall                     |         | 0.11**  |         |          | 0.12    |
|  | World food prices                    | 0.24*** | 0.12*** |         |          |         |
|  | Average earnings                     | 0.37*** | 0.24*** | 0.72*** | 0.33***  |         |
|  | Producer price index (whole economy) | 0.49*** |         |         | 0.36***  | 1.17*** |
|  | Electricity prices                   |         | 0.81*** | 0.41*** |          |         |
|  | R <sup>2</sup>                       | 0.99    | 0.98    | 0.92    | 0.99     | 0.99    |
| <b>Short-run equation: impact on year-on-year growth</b> | % change in temperature OYA          | 0.31    |         |         | 0.38***  | 0.05    |
|  | % change in rain OYA                 |         | 0.00*** | 0.00    |          |         |
|  | World food prices in local currency  | 0.22*** |         | 0.02    |          |         |
|  | Manufacturing wage costs             |         |         |         | 0.34*    |         |
|  | Producer price index (whole economy) |         | 0.01**  | 0.13    | 0.59***  | 1.08*** |
|  | Average earnings                     |         |         | 0.46*   |          |         |
|  | ECM term                             | -0.28** | 0.23*** | -0.06*  | -0.14*** | -0.45** |
| R <sup>2</sup>   | 0.53                                 | 0.00    | 0.25    | 0.36    | 0.9222   |         |

\*Variable significant at 1% probability \*\*Variable significant at 5% probability \*\*\*Variable significant at 10% probability  
Source: Oxford Economics

**A 1% increase in the average temperature increases food producer prices by 0.96%-2.17% across the five ASEAN countries.** These results are largely comparable to previous estimates in OE/FIA (2022).<sup>2</sup> Among the five countries, food prices in the Philippines are most vulnerable to rising temperature. We find that a 1% increase in the average temperature increases food producer prices in the Philippines by 2.17%. This sensitivity could be explained by its geography and exposure to climate-related adverse events such as typhoon, the vulnerability of its agricultural system to weather changes, and weaker infrastructure for price stabilisation.

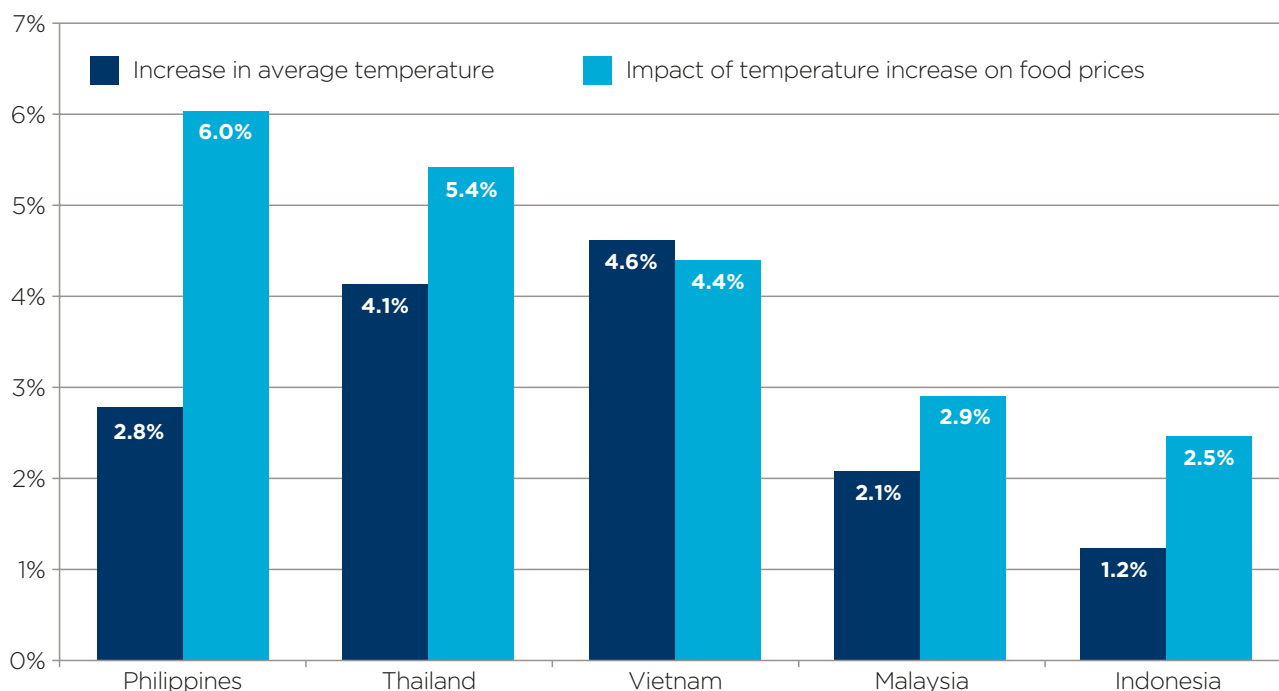
**Other cost drivers such as labour, energy, and overall manufacturing costs continue to play an important role in determining the long-term trend in producer food prices.** For example, our updated analysis suggests that over the long run, a 1% increase in the overall producer price index in Indonesia increases food producer prices by 0.49% (compared to 0.44% in the previous report). Average earnings (a proxy for labour costs) are also key drivers of food production costs in the long term, passing through to producer prices for food with a coefficient varying between 0.24-0.72 across the economies we estimated equations for.

**Contextualising these effects in the current environment suggests an economically important impact of climate change on food price.** In the last decade, average temperatures rose by 1.2%-4.6% across ASEAN countries. This rate of change implies that rising average temperature added around 2.5%-6.0% to food prices in these two economies over the decade (Figure 2). Among the five countries, food prices in the Philippines were most affected by rising temperature due to a relatively fast increase in ambient temperature and the sensitivity of food production prices to temperature increase (see Figure 1).

<sup>2</sup> While the difference in unit of analysis makes direct comparison difficult, our estimated impact of physical risks on food prices according to different global warming pathways is consistent with the findings from European Central Bank (2023). They find that future warming will cause increases in annual food inflation in ASEAN to the tune of 1-2 percentage point per year.



**Figure 2: Estimated impacts of rising temperature across Southeast Asian countries in the previous decade**



Source: Oxford Economics/Haver Analytics

### 2.3 COSTS OF ENERGY TRANSITION

**In this section, we assess the impact of the energy transition on food prices across ASEAN countries until 2050.** Specifically, we compare the trajectory of producer food prices between a baseline scenario (similar to a stated policy scenario by the International Energy Agency) and a Net Zero scenario (in which countries across the world follow up with their existing commitments such that the world would collectively reach net zero emissions by 2050). In both cases, we consider the actions of countries globally given the interlinked nature of

international economic and energy system. This analysis combines the results from our econometric model in Section 2.2 with forecasts to 2050 from OE's Global Climate Scenarios (see Box 2 for more details).

**This analysis updates and advances the work in the original OE/FIA report (2022) in several aspects.** Firstly, we extend the modelling exercise to show the impact for all five countries. This is powered by the expansion of geographic coverage of OE Global Climate Scenario (GCS)—which initially only included Indonesia among

the five studied countries.<sup>3</sup> Secondly, the GCS has also undergone a number of methodological improvements to reflect advancement in the latest academic literature. Thirdly, the baseline and Net Zero scenario has been continuously updated according to the latest economic, political, and technological developments. The Net Zero scenario has also been re-calibrated to reflect the slow pace of global progress in the last two years, and the subsequent bolder transition policies perhaps needed to achieve net zero emission by 2050.

<sup>3</sup> Among the five countries in the report, the GCS is only available for Indonesia, Malaysia, the Philippines and Thailand. For Vietnam, we infer forecasts of producer price index from PPI for Indonesia. This assumption is consistent with both countries' focus on ensuring its competitiveness compared to other countries in the region. They also share similarity in their coal-dominated energy structure (which affect their exposure to transition risks).

**Across the five studied countries, the modelling results suggest an increase of 30.8%-58.9% in food production costs associated with a successful energy transition.**

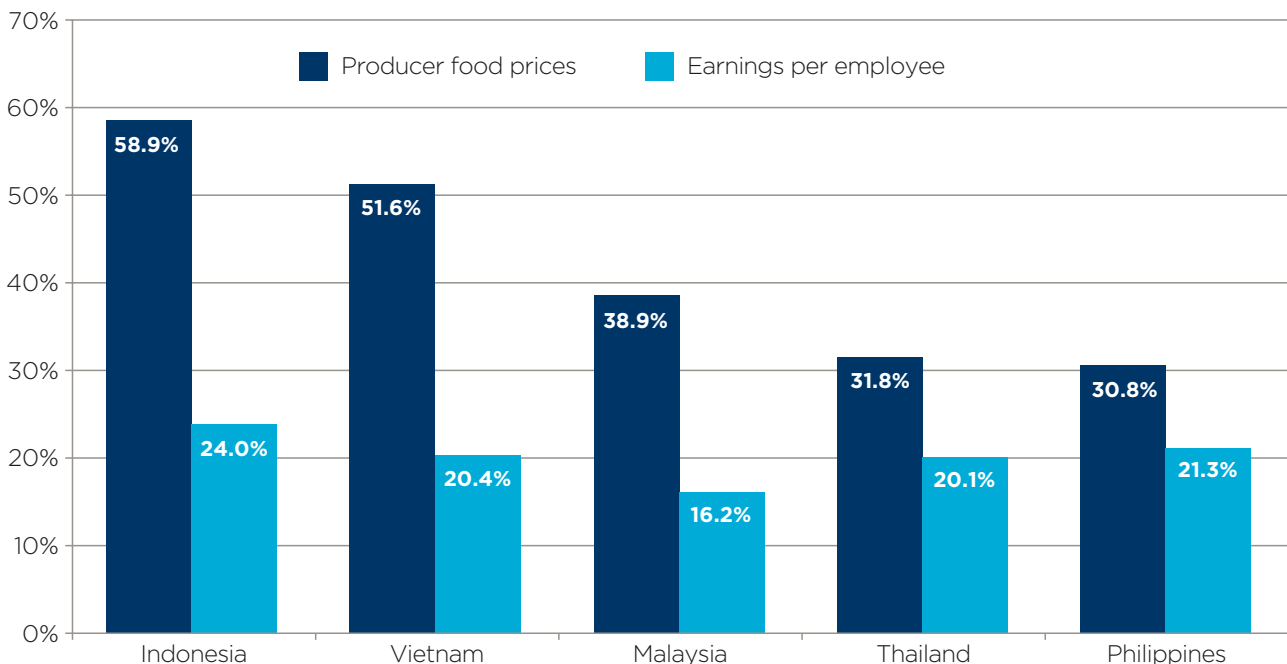
On the one hand, realising the global net zero goal by 2050 would alleviate the physical risks from climate change as global warming is limited to around 1.5°C (compared to 2°C under baseline). On the other hand, the transition would affect the other long-term drivers of the cost of producing food, particularly the cost of energy and labour. As all ASEAN economies remain dependent on fossil fuels for energy demand, additional energy taxes, and regulations

to meet the net zero carbon emissions (NZE) agenda (such as carbon taxes) will drive up the production cost for the whole economy, including the food sector. For food products, the transition risks will not only increase the fuel and electricity bill for producers, but also for transportation, cold chain storage, and warehouse. The higher prices would transmit to labour costs as workers will demand higher wages to keep up with the increased cost of living.

**Food prices in Indonesia are most exposed to transition risks:** projected to rise by 58.9% in 2050 in our Net Zero scenario, compared to baseline

projections (Figure 3). This divergence partly reflects the country's dependence on fossil fuels and its vulnerability to rising global food prices. According to the International Renewable Energy Agency, coal and oil account for 65% of Indonesia's energy supply (IRENA, 2023)<sup>4</sup>. While the updated estimate shows a relatively smaller impact than the original study (OE/FIA, 2022), the size of the effect remains economically important and would call for serious attention from policymakers to support the sector during the transition.

**Figure 3: Producer food prices and earnings in 2050, % differences, net zero compared to baseline (stated policies)**



Note: Forecast on earning per employee for Vietnam, currently not offered by Oxford Economics' Global Climate Service, is extrapolated using the regional average.

Source: Oxford Economics



## OXFORD ECONOMICS' GLOBAL CLIMATE SCENARIOS

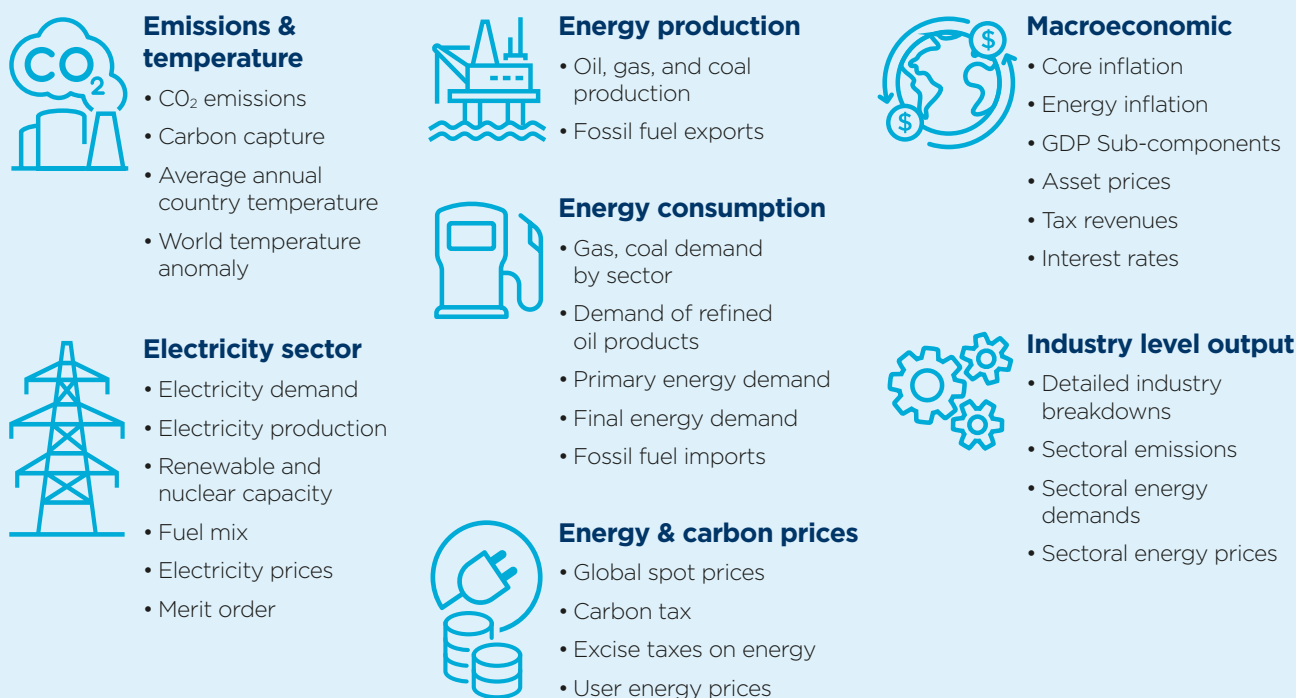
At the core of our climate modelling capability is the Oxford Economics' Global Economic Model (GEM). The GEM provides a rigorous and consistent structure for analysis and forecasting and allows the implications of alternative global scenarios and policy developments. The GEM replicates the world economy by interlinking 85 countries, six regional trading blocs and the eurozone. These countries are interlinked through international trade in goods and services, competitiveness (measured by unit labour costs adjusted for the exchange rate), capital markets, interest rates, and commodity prices. Our climate modelling adds a dedicated energy modelling module and its interaction with the overall economy to the GEM. This helps incorporate a number of policy levers such as energy intensity, energy mix and investment to achieve given emissions and energy transition pathways (Figure 4).

Our baseline scenario reflects commitments that are backed up by policy measures and believed to be sufficiently detailed. For example, the EU, China, and the UK have stated their intentions to achieve carbon neutrality by mid-century, but those ambitions are not sufficiently backed by policies such as carbon pricing and investment.

Therefore, we see a global energy mix that remains heavily reliant on energy sources such as coal, oil, and gas by 2050. Emissions decline over the horizon but fall well short of achieving net zero. As a result, average global temperatures reach 1.9°C above pre-industrial levels in 2050.

In the OE proprietary Net Zero scenario, net zero carbon emissions are achieved in 2050 through early policy action, technological advances, and global coordination. Governments implement stringent policies to target global warming of 1.5°C, reaching global net zero CO<sub>2</sub> emissions in 2050. Aggressive, globally coordinated carbon pricing and technological investment support a move towards cleaner and more efficient energy consumption. Higher taxes cause significant inflationary pressures that erode profits and household wealth. But the investment drive and productivity benefits associated with lower temperatures help to reduce the economic impact. Government carbon tax revenues are sufficient to cover the fiscal costs of the transition. In this scenario we do not assume that investment brings spare capacity into the economy, nor do we quantify any benefits associated with innovation.

**Figure 4: Climate-related variable coverage in the Oxford Economics' Global Economic Model**













## 3. DOMESTIC POLICIES TO MITIGATE THE IMPACT

### KEY INSIGHTS

- ASEAN economies have benefitted from the reconfiguration of global supply chain. In 2022, ASEAN accounted for roughly a third (36%) of global FDI inflows, up from 26% in 2012.
- Governments also need to shift the focus from attracting investors to retaining existing investors through investor after-care services and ensuring an open trade regime. Since the Russia-Ukraine crisis, ASEAN countries introduced eight export restrictions related to food, out of the 95 measures globally tracked by the International Food Policy Research Institute (IFPRI).
- There is a wide gap in productivity and business practice that prevents FDI firms and local food manufacturers from working together as suppliers or as business partners. For example, foreign firms are between three and 10 times more likely to possess internationally recognised quality certification than domestic firms. Improving in the productive capacity of domestic industries is key to strengthening this linkage and ensure the transformative impact of FDI firms for the industry in responding to the physical and transition risks associated with climate change.

### 3.1 INTRODUCTION

**In 2022, we called on policymakers to mitigate the impact of climate change and energy transitions on food prices by prioritising two key areas: measures to lower producers and consumers exposure to weather volatility; and to work to ease the costs of transition for the sector. However, the current economic condition limits the fiscal space for aggressively expanding government expenditure in the next few years.** ASEAN governments have been facing difficult fiscal pressure to deal with the twin challenges of the Covid-19 pandemic, and the slowdown in global demand that decimated export-oriented economies such as

Singapore and Vietnam. As a result, public debt in ASEAN countries has surged from 38.6% of GDP in 2019 to 47.9% in 2022. This context puts in doubt the prospect for increasing welfare and social assistance spending to protect consumers against rising food prices and volatility.

**In this context, we identify the new waves of FDI to ASEAN, partly fuelled by global supply chain reconfiguration, as a key driver of the transformation of the regional food production system.** However, maximising these benefits will require authorities to address key regulatory issues related to foreign ownership, keeping a fair and level-playing

field as well as open trade regimes, proactively providing administrative, operational, and strategic assistance to existing investors, and strengthening industrial linkages through supporting a competitive domestic industry.

### 3.2 A GOLDEN OPPORTUNITY TO TAP GLOBAL FDI

**The rise of ASEAN as a key destination for global FDI inflows has been an important and positive trend for the region.** In 2022, ASEAN

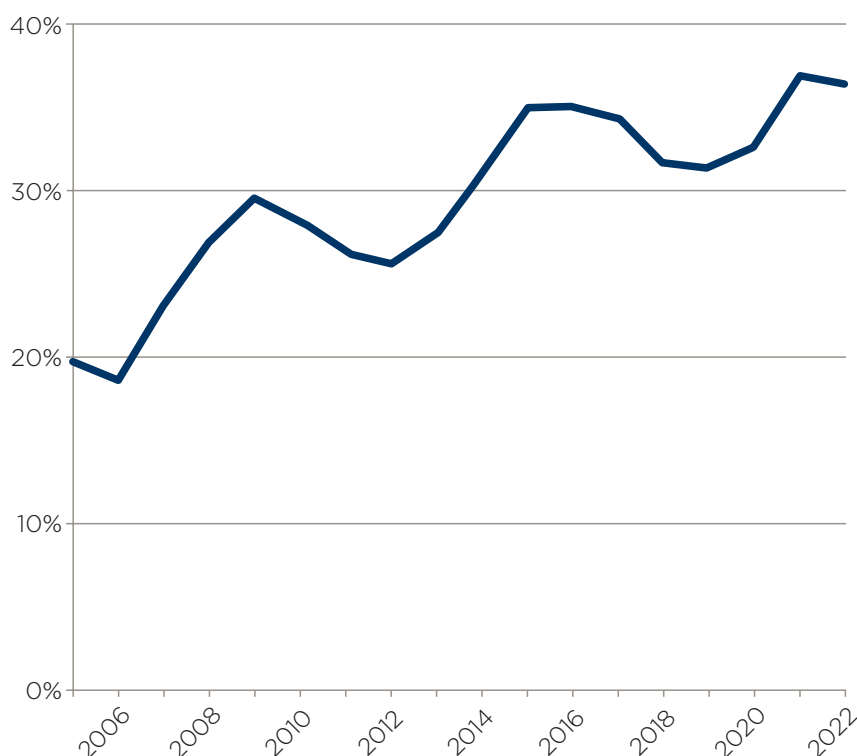
accounted for roughly a third (36%) of global FDI inflows, up from 26% in 2012 (Figure 5).

Focusing on flows of raw inputs and intermediate goods, Nguyen-Quoc (2024)<sup>5</sup> finds that a number of countries in the region have strengthened their participation in global production networks.

Vietnam and Indonesia, in particular, saw their export of intermediate goods growing by double-digit percentages in the last five years.

**A number of factors have supported this trend.** First is that rising costs, especially labour costs, in China has led multinationals to relocate parts of their production to more competitive locations. Secondly, the renewed focus on supply chain resilience following the Covid-19 pandemic and heightened trade tensions also led to a rerouting of global supply chains—especially in Asia. Last but not least, Chinese multinationals are now also expanding their presence abroad, in search of less saturated competitive markets and a more favourable cost base. By 2023, China grew to become the top FDI investor in Vietnam (Nguyen-Quoc, 2024).

**Figure 5: ASEAN's share in global FDI inflows, 2005-22**



Note: Annual figure represents 3-year rolling average

Source: Oxford Economics based on data from UNCTAD's *World Investment Report 2023*<sup>6</sup>

#### **FDI can act as a catalyst for ASEAN's food industry.**

Unprocessed goods such as commodities and other raw agricultural products, continue to account for 28% of ASEAN's food exports—suggesting ample room for upgrading and adding value to ASEAN's food industry. By working together with FDI firms as business or trade partners, local firms can pick up new expertise and knowledge thanks to the process of learning-by-doing, leading to increased efficiency, productivity, and global competitiveness for local businesses. Additionally,

FDI unlocks broader market access through established international networks, enabling export diversification and revenue growth for ASEAN countries. Beyond economic benefits, FDI creates new jobs across the food chain, uplifting livelihoods, and stimulating overall economic growth. Finally, competition spurred by FDI drives innovation, resulting in a wider variety of high-quality food products for consumers.

<sup>5</sup> <https://www.oxfordeconomics.com/resource/the-deglobalisation-myth-how-asias-supply-chains-are-changing/>

<sup>6</sup> <https://unctad.org/publication/world-investment-report-2023>

**In this context, FDI brings important processes and know-how in meeting the ever-more stringent regulations and standards in global food production.**

For example, our analysis of manufacturing firms in ASEAN countries suggests that foreign firms are between three and 10 times more likely to possess internationally recognised quality certification than domestic firms (Figure 6). They are also more likely to invest in research & development, introduce new innovation to their processes and license

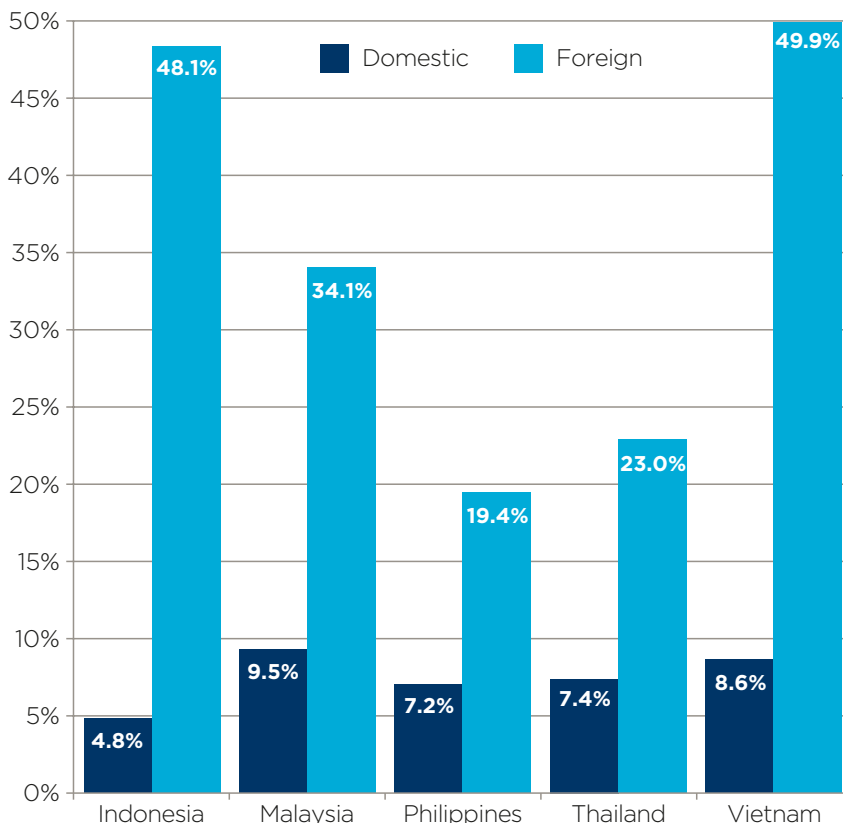
technologies from abroad. The presence of FDI firms can yield a positive impact on local firms through various channels such as providing higher quality inputs and services to domestic producers, and creating a critical mass of demand to develop downstream services such as logistics and distribution. When they source ingredients from local suppliers, local firms and workers can also benefit from the exposure to modern practice, new innovation, and developing local skills through a process of learning-by-doing.

**3.3 POLICY OPTIONS TO MAXIMISE THE BENEFITS OF FDI**

**ASEAN governments can strengthen the legal framework to increase the attractiveness of the agri-food sectors to foreign investors.** The average score for regulatory restrictiveness for our five ASEAN countries is about six times higher (more restrictive) than for OECD countries, based on the OECD FDI Regulatory Restrictiveness Index for the food sector. Barriers are particularly restrictive for food sector investors in Indonesia and Thailand, and the restrictive instruments are often related to equity restriction (where countries often limit foreign ownership).

**Whereas the majority of policy attention is typically focused on attracting FDI, it is equally important for ASEAN economies to retain existing investors in their economies.** This would entail a stronger focus on investor after-care services in providing investment facilitation, infrastructure development, and business support services. Furthermore, keeping the trade regime open, transparent, and efficient are critical to the functioning of FDI firms, which are more likely to engage in export and import activities than domestic firms. Since the Russia-Ukraine crisis, ASEAN countries introduced eight export restrictions related to

**Figure 6: Share of firms with an internationally recognised quality certification**



Note: Foreign firms are defined as those with 10% or more foreign ownership  
Source: Oxford Economics based on data from World Bank Enterprise Surveys<sup>7</sup>



food, out of the 95 measures globally tracked by the IFPRI. These types of measures have been found to be ineffective at controlling inflation and may trigger tit-for-tat race across food exporting countries that fuel global food price rises even further (ADB, 2013)<sup>8</sup>.

**Furthermore, the industrial linkage between local food manufacturers and leading FDI firms in ASEAN economies remain limited.** For example, our analysis of World Bank Enterprise Surveys data for Malaysia suggests that only 4.1% of food manufacturers engage in indirect exports (i.e., selling their products to other domestic firms who later export those products abroad), compared to 6.5% for the whole manufacturing industry. Similar gaps persist in Indonesia and other ASEAN countries.

**The weak industrial linkage limits the upgrading benefits to local producers and puts local producers at risk of being excluded from formal food value chains.** It prevents the process of technology spillovers from FDI firms to domestic producers outlined in section 4.2. It may also lead to exclusion of SMEs

and vulnerable groups from participating in the modernised food value chains. This issue becomes even more important as the demand from the burgeoning domestic middle class becomes more sophisticated and supply chain management processes become more digitalised thanks to new technologies such as blockchains and artificial intelligence. Without proactive government interventions, the boons from foreign investment flows may not help local producers to leapfrog to the next technological frontier (Pipkins and Fuentes, 2017).

**Improving the productive capacity of domestic industries is key to strengthening the linkage to foreign capital and domestic firms.** Investment in climate smart agriculture, capacity-building programmes and knowledge transfer initiatives can help address the wide gap in productivity, quality, and management practice between FDI and local producers. In contrast, local content requirements could stunt the development of the industry as they prevent the development of competitive markets (OECD, 2020).<sup>9</sup>

Furthermore, considerable gaps in national quality infrastructure exist across ASEAN countries despite recent efforts for harmonisation through the ASEAN Consultative Committee for Standards and Quality. Closing these gaps will require further investments in the regulatory framework, infrastructure, and expertise (such as those required for testing, measurement and conformity assessment body accreditation). Governments may also consider providing direct financial and technical support for small holders to adopt certifications such as Global G.A.P, HACCP, and organic certification.

<sup>8</sup> <https://www.adb.org/sites/default/files/publication/30386/ewp-367.pdf>

<sup>9</sup> <https://www.oecd-ilibrary.org/sites/70aed0d7-en/index.html?itemid=/content/component/70aed0d7-en>











# 4. INTERNATIONAL COOPERATION TO EASE THE COST OF TRANSITION

## KEY INSIGHTS

- ASEAN is becoming more important for global food security. Its share of global food exports has increased from 6.6% in 2000 to 9.1% in 2021. Out of 15 staple food categories, ASEAN accounts for more than 10% of global production in five categories.
- Rising food prices in ASEAN also directly and indirectly raise global cost of living. This happens, firstly, through the region's increased integration into the global food value chain; secondly through the impact of domestic food bills on labour costs in ASEAN—the world's growing manufacturing hub.
- International cooperation can aid in mitigating physical and transition risks through various measures such as providing financial assistance, technical expertise, and risk mitigation measures to accelerate investments in renewable energy, climate smart agriculture, and critical infrastructure in ASEAN economies. Furthermore, global dialogue is needed to support ASEAN food producers in meeting the compliance cost of new environmental policies in high-income countries.

## 4.1 INTRODUCTION

In *OE/FIA (2022)*, we focused our assessment of the ASEAN policy response at the domestic level, and tackling climate change. In this study, we situate ASEAN's food production within the global context.

Our analysis highlights a closely linked two-way interaction between ASEAN's food prices and the global development process. On the one hand, ASEAN's food production is becoming ever more integral to global food security. Rising food prices in Asia also create concerns for the costs of living globally, as ASEAN becomes more integrated in the global production network. In this context, interventions to contain food prices in ASEAN may also contribute towards mitigating the inflation uplift for the rest of the world economy.

On the other hand, section 2 of this report highlights how the global energy transition towards net zero emissions can have a significant impact on food prices in ASEAN. This section then identifies how development partners can help in supporting a successful transition for the region's food industry.

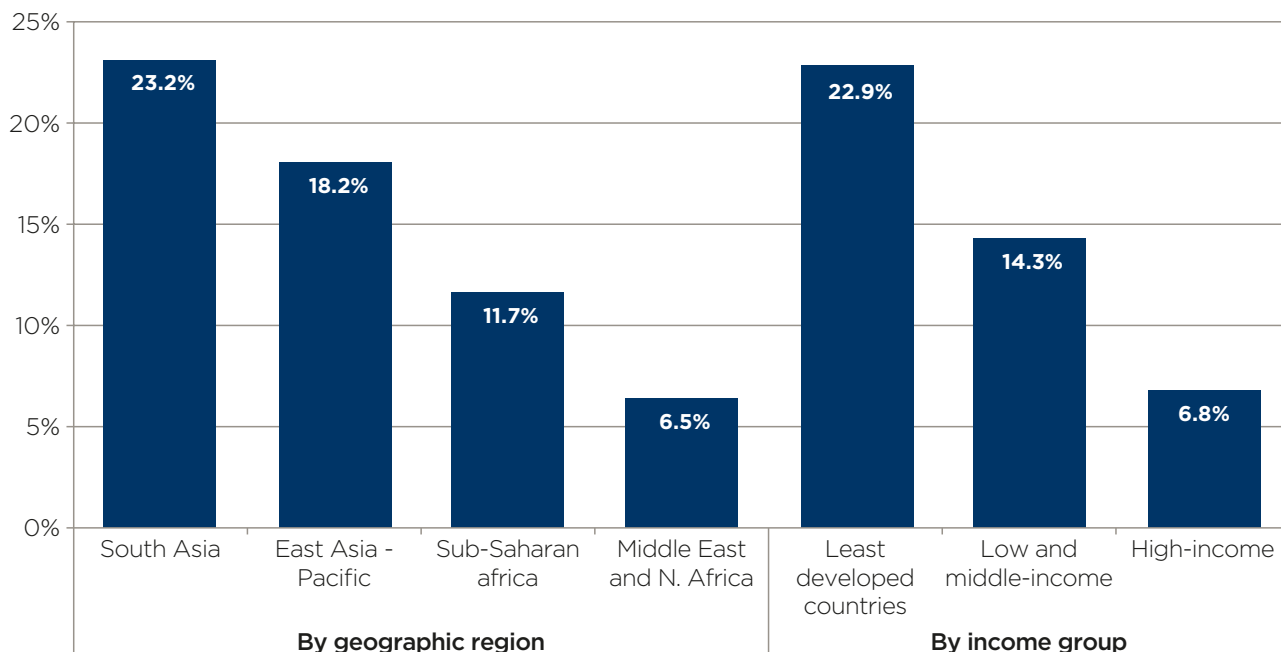
## 4.2 ASEAN'S GROWING IMPORTANCE FOR GLOBAL DEVELOPMENT

**ASEAN's importance to global food security continues to grow.** The share of global food imports sourced from ASEAN producers has increased from 6.6% in 2000 to 9.1% in 2021. Its significance stretches far beyond East Asia, making up a significant portion of food imports in South Asia, Africa, and the Middle East (Figure 7).

ASEAN's food production matters especially for the least developed countries (LDCs), with the import share standing at 22.9% in 2021, up from just 14.2% two decades ago.

**The importance of ASEAN for global food security is ever clearer when focusing on trade in staple foods.** These agricultural commodities often carry lower value, and their importance may not be as pronounced in the analysis of trade values. Focusing on the 15 staple food categories, ASEAN countries accounted for more than 10% of global production in five categories. In particular, ASEAN made up 37.6% of vegetable oil production and 24.7% of rice production globally.

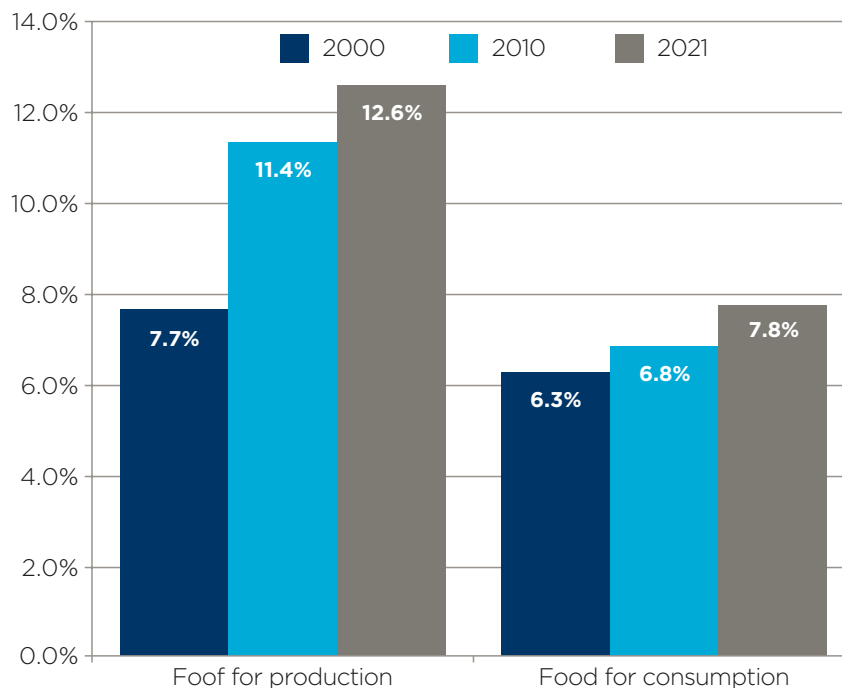
**Figure 7: ASEAN's share in total food imports by region/country income group, 2021**



Source: Oxford Economics based on data from FAOSTAT

**Rising food prices in ASEAN also have knock-on impacts on global cost-of-living as the region has made remarkable progress in its integration into global food value chains.** ASEAN's share of global exports of raw and intermediate food inputs for industrial use has risen from 7.7% in 2000 to 12.6% today (Figure 8). For instance, according to the Food and Agriculture Organization (FAO), Malaysia and Indonesia make up more than 80% of the world's exports of palm oil. It is an intermediate input widely used in industries ranging from food processing and cosmetics to biofuels. It follows that higher prices from ASEAN will inevitably translate into higher industrial production costs globally.

**Figure 8: ASEAN as % of global exports of food for production and consumption**



Source: Oxford Economics/UN COMTRADE

**Food prices in the region also matter through their indirect impacts on other industries globally.** For one, rising domestic food bills are bound to push up labour costs in ASEAN, given that food made up 19%-37% of the consumer price index basket of goods and services across the region. Notably, ASEAN's role as the world's manufacturing hub has grown significantly over the years, with its share of global goods exports volume rising from 4.3% in 2000 to 6.0% in 2022. This implies that costlier wages in the region would lead to more broad-based inflationary pressure across various industries beyond food production, and its impact is set to be global.

**This section has ascertained the importance of ASEAN's food prices for global development through multiple channels:** food security (especially for LDCs), higher input costs for downstream food industries and more broad-based cost pressure through higher manufacturing costs in ASEAN. As a result, the impact of climate change on food prices in Southeast Asia has consequences for global inflation and the cost-of-living. This positive externality thus makes a case for global cooperation to support producers in ASEAN to mitigate the impact of physical and transition risks.

#### **4.3 HOW CAN INTERNATIONAL COOPERATION HELP?**

**Development partners could help mitigate the physical risk of impacts.** They can provide crucial support to enhance agricultural productivity and resilience in Asian countries. This support may include investments in climate-resilient agriculture, water management systems, and agricultural infrastructure. Additionally, development partners can assist in establishing early warning systems for extreme weather events and natural disasters, which often disrupt food supply chains and contribute to price volatility.

**Furthermore, development partners can also play a pivotal role in supporting the transition to net zero emissions in the agricultural and food sector.** They can provide valuable financial assistance, technical expertise, and risk mitigation measures to accelerate investments in renewable energy in ASEAN economies. Similarly, the Global Environment Facility funds projects like the Sustainable Rice Platform, which works with rice producers in countries like Thailand and Vietnam to implement practices that reduce methane emissions from rice paddies. Scaling up these efforts could contribute to mitigating the broader impacts of rising food prices in ASEAN for the global economy.

**Finally, there needs to be a global dialogue on supporting ASEAN food producers to meet the new environmental policies, increasingly adopted unilaterally by high-income countries.** For example, the new European Union (EU)'s deforestation regulation, introduced in June 2023, has created considerable concerns among producers in ASEAN regarding the stringent requirement for compliance (such as due diligence, traceability, and risk assessment and monitoring). The EU's Carbon Border Adjustment Mechanism (CBAM) is another example of domestic climate policy with extraterritorial impacts on production abroad. CBAM aims to create a level playing field for EU producers by applying additional carbon taxes on imports from jurisdictions with low carbon taxes. This effectively imposes additional import duties and compliance cost for producers from ASEAN. While CBAM is not yet applied to food imports to Europe, given the direction of the global energy transition, ASEAN's food industry may soon need to upgrade its capacity to better tackle these emerging challenges.







## 5. CONCLUSION: CALL TO ACTION

The findings presented in this extended report underscore the urgent need for action to address the complex interplay between climate change, food prices, and the energy transition in ASEAN countries. Expanding the scope of our econometric analysis to a longer time frame (29 years), we continue to find a significant impact of changes in weather pattern, especially rising average temperature, on food prices across the five ASEAN countries. The risks associated with the energy transition may also induce a 30.8%-58.9% increase in food prices, over and above our stated policy baseline.

With climate change exacerbating food price volatility and the looming energy transition posing significant risks to food production costs, there is a critical imperative for ASEAN governments to prioritise

policies that attract and retain foreign investment in the food sector, while also investing in the productive capacity of local producers.

This study makes clear that food prices in ASEAN also have implications for global development in the context of climate change and energy transition. In particular, the region has become ever more important for global food security, especially in regions vulnerable to climate change such as South Asia, and economies with a weaker ability to adapt to energy transition such as in many of the world's least developed countries.

Global cooperation is thus essential to mitigate the cost of transitions for ASEAN's food sector, given its integral role in global supply chains and its potential impact on global inflation and the cost of living.

The energy transition is inevitable. We urge governments in ASEAN and worldwide to collaborate closely with the food industry to develop and implement strategies that effectively address these twin challenges in the years ahead. The time for action is now, and concerted efforts are needed to safeguard food security, mitigate climate risks, and ensure a sustainable future for ASEAN and the global community.







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## FOOD INDUSTRY ASIA

Food Industry Asia (FIA) was formed in 2010 to enable major food manufacturers to speak with one voice on complex issues such as health and nutrition, food safety, sustainability, and harmonisation of standards. From its base in Singapore, FIA seeks to enhance the industry's role as a trusted partner and collaborator in the development of science-based policy throughout Asia. To do so means acting as a knowledge hub for Asia's national industry associations and affiliated groups, to support with their engagement of public bodies and other stakeholders across the region.

### March 2024

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