Urban Exposure: Human Development Impacts of the Middle East Conflict in Asia and the Pacific

Methodological Note

Overview

This note describes the assumptions underlying the three recovery scenarios modelled using the UNDP multi-country Computable General Equilibrium (CGE) model. The CGE draws on simulation results disaggregated for 29 urban economies across Asia and the Pacific, supplemented by evidence from secondary data sources. All three scenarios share a common baseline: a 120-day conflict period representing approximately one-third of the year, during which the Middle East conflict generated simultaneous shocks across trade, productivity, capital, labour, and remittance channels. The scenarios differ only in their assumptions about the speed and nature of the post-conflict recovery trajectory.

Fixed Assumption: 120-Day Conflict Period

All three scenarios apply the same conflict-period shocks simultaneously across 13 countries, regions, and territories included in the modelled 120-day conflict scenario. The shocks are prorated to represent annual averages and operate through five channels:

1. Trade margins

Trade costs rise for imports into and exports from countries, regions and territories covered by the conflict scenario (Israel, the Islamic Republic of Iran, Bahrain, Iraq, Jordan, Kuwait, Lebanon, Oman, Qatar, Saudi Arabia, Syria, United Arab Emirates, State of Palestine (Gaza and West Bank)). For general goods, trade margins are multiplied by 1.5 above their pre-conflict levels. For fuel and energy products, trade margins are multiplied by 20 above the pre-conflict levels – reflecting the elevated risk of disruption assumed under the scenario for the Strait of Hormuz and sharp increases in conflict-risk insurance premiums charged by shipping companies.

2. Total factor productivity

The 120-day conflict scenario incorporates an assumed reduction in overall economic productivity through three channels, calibrated to the conflict period. First, the scenario applies an economy-wide productivity loss of 0.25 percent per year to all sectors in the affected countries and territories, capturing the general disruption, resource diversion and institutional strain typically associated with an active conflict. Second, an additional and much larger productivity loss (50 percent per year) is applied specifically to the fuel and energy sector, reflecting the particular vulnerability of energy production and distribution during periods of an active conflict.

Third, a fertilizer-related agricultural productivity loss of 2.5 percent per year is applied to all low- and middle-income countries globally, capturing the effect of higher fertilizer prices and reduced agricultural input availability that would result from disruptions to Middle East supply chains under this scenario.

3. Capital

For the three most directly affected economies – Israel, the Islamic Republic of Iran, and Lebanon – permanent capital destruction is applied at rates of 0.5, 2.5, and 2.5 percent respectively, reflecting differences in the intensity of conflict-related physical damage. This permanent destruction is compounded by temporary economic disruption affecting approximately 24 percent of each economy for the duration of the conflict, capturing factory closures, supply chain breakdowns, and the temporary halt of economic activity. For all other conflict-affected countries and territories in the region, only temporary disruption is applied, with no permanent capital loss assumed.

4. Labour supply

Under the 120-day conflict scenario, labour supply in the affected countries and territories is assumed to fall by 24 percent, reflecting workforce disruption, displacement of workers, and the diversion of labour toward conflict-related activities, such as military service or emergency response. Averaged across the full year, this translates to an effective annual reduction of approximately 7.9 percent.

5. Remittances

Kuwait, Oman, Qatar, Saudi Arabia, and United Arab Emirates are assumed to reduce their remittance outflows by 2 percent for the duration of the modelled conflict period, prorated to an annual average reduction of approximately 0.66 percent. This reduction has a direct impact on key receiving countries in South and Southeast Asia – namely Bangladesh, Bhutan, India, the Maldives, Nepal, Pakistan, the Philippines, and Sri Lanka – where remittance income from Gulf workers represents an important source of household income and foreign exchange. The reduction is distributed across these receiving countries proportionally to their historical shares of remittance inflows from the Gulf.

Scenario 1: Immediate adjustment

This scenario assumes that following the 120-day conflict period, all economic conditions return immediately to their pre-conflict baseline. There is no lingering disruption, no elevated trade costs and no persistent productivity loss beyond the conflict period itself. This represents the most optimistic recovery path and serves as a benchmark against which the costs of slower adjustments in the other two scenarios can be assessed.

Scenario 2: Four-month adjustment period

This scenario assumes that recovery from the conflict takes an additional four months beyond the 120-day conflict period, during which shocks gradually decline but do not immediately return to the baseline. The four-month adjustment period is divided into three sub-periods of 40 days each, with shocks progressively easing across each sub-period. Full-recovery – a return to zero shock – is reached at the end of the four months.

The adjustment follows different decay paths for trade costs and other economic channels, reflecting the empirical observation that financial and insurance markets tend to recover more slowly than real economic activity after a conflict.

Trade margins

Trade margins remain elevated, but on a declining path over the three sub-periods of approximately 40 days each. In the first sub-period, margins remain at 75 percent of their conflict-period level, reflecting the persistence of elevated insurance premiums and logistics disruption beyond the modelled conflict period. In the second sub-period, this falls to 55 percent as normalization begins. In the third sub-period, margins drop to 25 percent as the recovery accelerates. By the end of the third sub-period, trade margins return fully to their pre-conflict baseline.

This assumption is supported by evidence from post-conflict shipping markets, where conflict-risk insurance premiums and freight surcharges typically persist well beyond the cessation of active hostilities. Recent commentary on prior Strait of Hormuz disruptions has noted that, historically, the resolution of shipping disruptions does not immediately normalize shipping costs, as insurance markets tend to reprice risk gradually and cautiously.

Non-trade shocks

Productivity losses, capital disruption, labour supply reductions and remittance flows all follow a halving path across the same four-month window. In the first month of the adjustment period, 50 percent of the conflict-period shock remains in effect. This falls to 25 percent in the second month, 12.5 percent in the third month and reaches zero – full recovery – by the fourth month. This faster decay for non-trade channels reflects the assumption that productivity, labour supply and financial flows can respond more quickly to improved security conditions than physical trade infrastructure and insurance pricing.

Scenario 3: Eight-month adjustment period

This scenario assumes a slower and more prolonged recovery, with the adjustment period lasting eight months beyond the 120-day conflict period. The total period of economic disruption, therefore, covers approximately a 12-month period from February 28, 2026 — when hostilities began — extending into early 2027. This represents a more pessimistic recovery path, consistent with post-conflict settings where institutional rebuilding, supply chain reorganization and the restoration of business and investor confidence takes considerably longer.

Trade margins

The same declining path as Scenario 2 applies, but each sub-period is substantially longer. In the first sub-period of 60 days, trade margins remain at 75 percent of their conflict-period level. In the second sub-period of 90 days, they fall to 55 percent. In the third sub-period of 90 days, they fall further to 25 percent. Full recovery occurs only at the end of the eighth month.

Non-trade shocks

The same halving path as Scenario 2 applies for productivity, capital, labour and remittances, but spread across the longer eight-month window rather than four months. The same percentage reductions apply in each successive sub-period – 50, 25, and 12.5 percent – but because each sub-period is longer, the average shock intensity across the full year is higher and the cumulative economic cost is larger than in Scenario 2.

Comparison across Scenarios

Across all five economic channels and all countries and territories, the eight-month adjustment scenario produces a larger cumulative annual shock than the four-month adjustment scenario, which in turn produces a larger shock than the immediate adjustment scenario. This ordering is consistent and holds regardless of the channel or country examined.

For trade margins, the difference is most pronounced for fuel and energy, where the combination of a large initial conflict-period shock and a slow insurance market recovery creates a substantially elevated annual average cost in the longer adjustment scenarios.

For productivity, capital and labour, the differences across scenarios are more moderate, since the halving path means that the additional shock in months five through eight of Scenario 3 is already small in absolute terms. Nevertheless, the cumulative effect is still meaningfully larger than in Scenario 2.

Poverty Calculation

Poverty estimates are derived ex-post from the CGE model outputs using quintile-level income data. The CGE model generates U.S. dollar per capita, per day consumption estimates for each of five income quintiles, for each country and scenario. These estimates are converted into 2021 PPP U.S. dollar. The resulting estimates are then used to fit a General Quadratic Lorenz curve, following Villasenor and Arnold (1989), which maps the cumulative population share to the cumulative income share. The poverty headcount ratio is recovered as the population share, at which the slope of the Lorenz curve equals the ratio of the poverty line to mean consumption. Estimates are produced based on World Bank international poverty lines (2021 PPP): US$4.20/day (LMIC) and US$8.30/day (UMIC).

Urban Disaggregation

The CGE model operates at the national level, using country-level data from GTAP12. Urban disaggregation of model results is implemented ex-post, after the national-level simulation is complete.

Specifically, national-level results for key macroeconomic indicators — including GDP, household consumption, investment and trade — are disaggregated into urban components by applying population shares. These shares are derived from World Bank demographic data on urban population distribution for each country for 2023 or the most recent year available.

This approach implies that urban areas are assumed to be affected proportionally to their population shares, with the same relative shock intensity applying across both. The urban split, therefore, reflects the distributional significance of each area within the national economy rather than structural differences in sectoral composition, labour markets or consumption patterns between urban and rural households.

Model Limitations

This CGE-based assessment rests on simplifying assumptions that should be made explicit. Five areas are particularly relevant:

1. Energy resilience and cross-country exposure

The model endogenously captures differences in energy exposure through price and trade channels: net exporters would gain from higher global energy prices, while net importers would face rising costs. All prices are endogenous in the model, and heterogeneity across countries, regions and territories is captured through differences in bilateral trade flows with conflict-affected countries and territories, country-specific substitution elasticities, and baseline trade composition.

The model does not explicitly represent policy or structural buffers – such as strategic petroleum reserves, fuel subsidy regimes, or short-run substitutions toward renewables. In practice, this means the pass-through of trade margin shocks varies across countries, regions and territories depending on their trade structure, but the model does not capture additional heterogeneity arising from policy buffers, potentially overstating impacts for countries, regions and territories with reserves or subsidies and understating them for those lacking fiscal space. This is a

limitation of the shock specification, not the model's architecture, which could incorporate such parameters with country-specific data.

2. Formal–informal labour segmentation

The model applies a single economy-wide labour supply shock (24 percent reduction during the 120-day conflict, prorated annually), without distinguishing formal from informal employment. Informal work often represents a large share of urban employment and responds differently to shocks: more exposed to demand-side volatility, but more flexible across sectors, while formal workers are shielded by regulations and yet face sharper losses when firms adjust. Distinguishing formal and informal labour as separate factors (analogous to the existing skill and gender disaggregation) would allow the model to capture differential employment, wage, and informality-transition effects, and represents a natural extension for future iterations, contingent on the availability of formal–informal employment shares by sector and country.

3. Gender representation in the labour market

Gender-disaggregated outcomes in this analysis derive from the model's underlying production structure. Based on International Labour Organization (ILO) data, labour is disaggregated across economic sectors by skill (skilled/unskilled), and within each skill category, by gender, with female and male labour treated as imperfect substitutes through a CES (constant elasticity of substitution) function. Gender-specific wage rates and employment levels are calibrated from base-year data on female and male employment shares by sector and skill level, and respond endogenously to shocks through this nested structure and associated substitution elasticity. An additional asymmetry arises through the model's unemployment mechanism: in lower-income country settings, unemployed skilled workers (female and male) are absorbed into unskilled labour supply at the unskilled wage rate, which can amplify gender differentials where baseline skilled-employment shares by gender diverge. Reported gender gaps in wage and employment impacts, therefore, reflect the combined effect of: (i) baseline gender-disaggregated employment shares by sector and skill level, (ii) substitution elasticity between female and male labour, and (iii) sector-specific incidences of conflict-related shocks.

4. Job quality beyond wages and unemployment

The analysis focuses on two standard CGE outcome variables – wages and unemployment – and does not capture broader dimensions of job quality that often adjust alongside or instead of these two margins, including reduced working hours, diminished job security, benefit and contract informalization, and transitions from formal into informal employment. While these margins of adjustment are well documented in labour market responses to economic shocks, they fall outside the variables a standard CGE framework is designed to track, since the model does not represent intensive-margin hours adjustments, contract types, or informality transitions as distinct outcomes. This limitation likely understates the full extent of labour market deterioration, as some of the adjustment that would otherwise show up as wage or employment losses may instead be absorbed through these unmodeled channels.

5. Fertilizer shock and crop heterogeneity

The fertilizer-related productivity shock is applied as a uniform 2.5 percent annual productivity loss across all low- and middle-income countries, reflecting a global average estimate of the impact of higher fertilizer prices and reduced input availability from Middle East supply chain disruptions. It is not differentiated by crop type or country-specific planting and fertilizer application calendars, due to the lack of granular data at the time of modelling. As a result, agricultural productivity losses are likely understated for countries, regions and territories with high fertilizer import dependence and overstated for those with greater ability to substitute to alternative sources — an uncertainty that should be borne in mind when interpreting country-level agricultural and poverty results.

Summary of Shock Parameters

The table below summarizes all shock parameters across the three scenarios as specified in the model.

Table 1. Summary of shock parameters across the three scenarios modelled using the UNDP CGE Model

Shock	Scope	Scenario 1 (Conflict only)	Scenario 2 (four-month recovery)	Scenario 3 (eight-month recovery)
Trade margins – general goods	All conflict-affected countries and territory (imports and exports)	Multiplier x1.5 (120 days)	Conflict: x1.5 (120 days). Adjustment: 75% then 55% then 25% of conflict shock (each lasting 40 days). Full recovery thereafter.	Conflict: x1.5 (120 days). Adjustment: 75% then 55% then 25% of conflict shock (60 + 90 + 90 days). Full recovery thereafter.
Trade margins – fuel and energy	Fuel and energy exports from conflict-affected countries and territory	Multiplier x20 (120 days)	Conflict: x20 (120 days). Adjustment: 75% then 55% then 25% of conflict shock (each lasting 40 days). Full recovery thereafter.	Conflict: 20x (120 days). Adjustment: 75% then 55% then 25% of conflict shock (60 + 90 + 90 days). Full recovery thereafter.
Economy – wide productivity loss	All sectors, all conflict-affected countries and territory	0.25% per year (prorated over 120 days)	Conflict: 0.25% per year (120 days). Adjustment: 50% then 25% then 12.5% of conflict shock (3 x 40 days). Full recovery thereafter.	Conflict: 0.25% per year (120 days). Adjustment: 50% then 25% then 12.5% of conflict shock (60 + 90 + 90 days). Full recovery thereafter.
Fuel and energy sector productivity loss (additional)	Fuel and energy sector, conflict-affected countries and territories	50% per year (prorated over 120 days)	Conflict: 50% per year (120 days). Adjustment: 50% then 25% then 12.5% of conflict shock (3 x 40 days). Full recovery thereafter.	Conflict: 50% per year (120 days). Adjustment: 50% then 25% then 12.5% of conflict shock (60 + 90 + 90 days). Full recovery thereafter.
Fertilizer – related agricultural productivity loss	Crop sector, all low- and middle-income countries	2.5% per year (prorated over 120 days)	Conflict: 2.5% per year (120 days). Adjustment: 50% then 25% then 12.5% of conflict shock (3 x 40 days). Full recovery thereafter.	Conflict: 2.5% per year (120 days). Adjustment: 50% then 25% then 12.5% of conflict shock (60 + 90 + 90 days). Full recovery thereafter.
Capital destruction (permanent)	Gulf sub-region: 0.5%, Iran: 2.5%, Lebanon: 2.5%	0.5%/2.5%/2.5% – permanent, not reversed in any scenario	Adjustment: 50% then 25% then 12.5% of conflict shock (3 x 40 days). Full recovery thereafter	Adjustment: 50% then 25% then 12.5% of conflict shock (60 + 90 + 90 days). Full recovery thereafter.

Shock	Scope	Scenario 1 (Conflict only)	Scenario 2 (four-month recovery)	Scenario 3 (eight-month recovery)
Capital disruption (temporary)	All conflict-affected countries and territories	24% of capital stock idled (prorated over 120 days)	Conflict: 24% (120 days). Adjustment: 50% then 25% then 12.5% of conflict shock (3 x 40 days). Full recovery thereafter.	Conflict: 24% (120 days). Adjustment: 50% then 25% then 12.5% of conflict shock (60 + 90 + 90 days). Full recovery thereafter.
Labour supply disruption	All conflict-affected countries and territories	24% reduction in labour supply (prorated over 120 days)	Conflict: 24% (120 days). Adjustment: 50% then 25% then 12.5% of conflict shock (3 x 40 days). Full recovery thereafter.	Conflict: 24% (120 days). Adjustment: 50% then 25% then 12.5% of conflict shock (60 + 90 + 90 days). Full recovery thereafter.
Remittance outflows	Sending: Kuwait, Oman, Qatar, Saudi Arabia and United Arab Emirates. Receiving: Bangladesh, Bhutan, India, the Maldives, Nepal, Pakistan, the Philippines and Sri Lanka.	2% reduction (prorated over 120 days)	Conflict: 2% (120 days). Adjustment: 50% then 25% then 12.5% of conflict shock (3 x 40 days). Full recovery thereafter.	Conflict: 2% (120 days). Adjustment: 50% then 25% then 12.5% of conflict shock (60 + 90 + 90 days). Full recovery thereafter.

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