

INTRODUCTION TO TARIFF REFORM SIMULATIONS USING UTAS

JANUARY 2022

THE “CAR ECONOMY” EXAMPLE

Assume we have a very simple economy that has **only three industries**: Steel production, Engine manufacturing and Car manufacturing. Let’s also assume that the Steel industry uses no inputs (all the output is value added), that the Engine industry uses steel (only input) and value added, and that the Car industry uses engines (only input) and value added. Assume that **steel and engines can be imported**, and that cars are only sold to final consumers (cars are not used as production inputs).

DOMESTIC STEEL
(100% VA)



DOMESTIC CAR
(60% ENGINE, 40% VA)

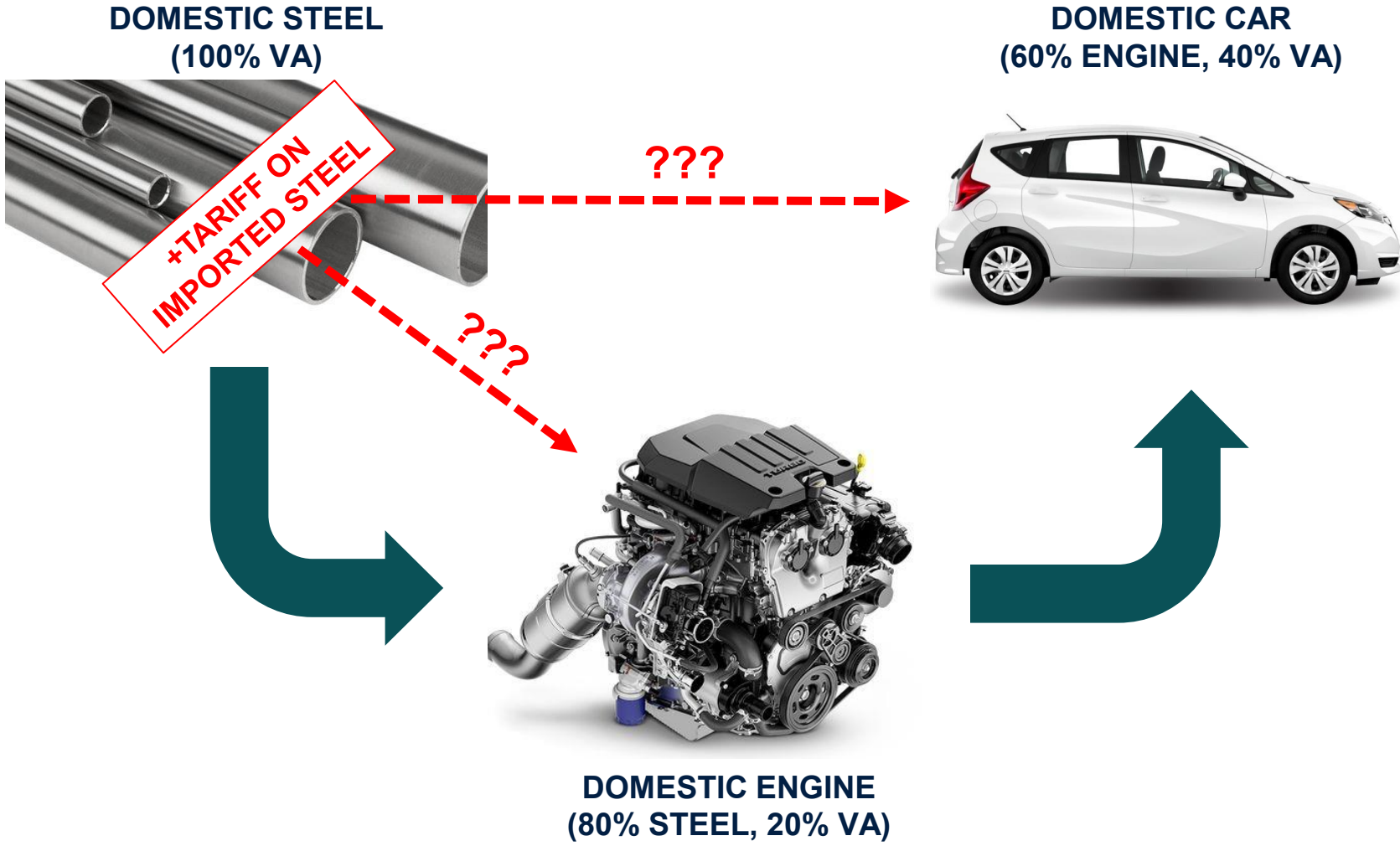


DOMESTIC ENGINE
(80% STEEL, 20% VA)

VA: VALUE ADDED

EXAMPLES OF QUESTIONS THAT CAN BE ADDRESSED WITH UTAS

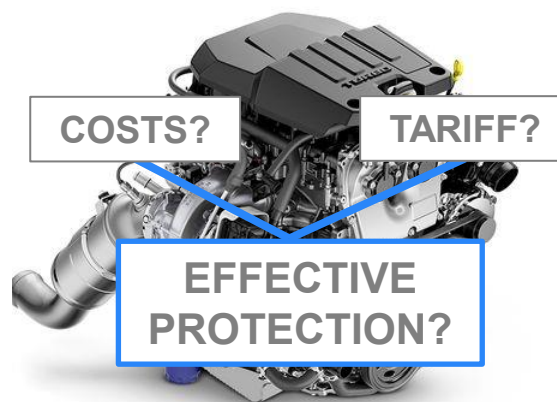
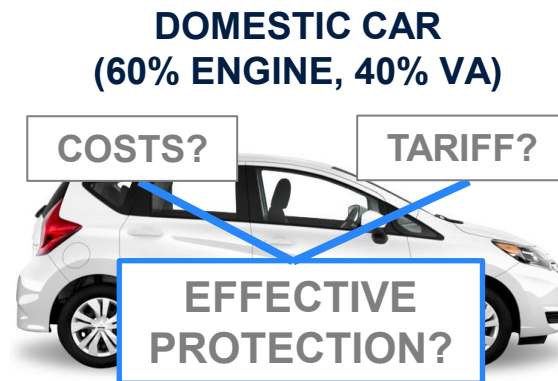
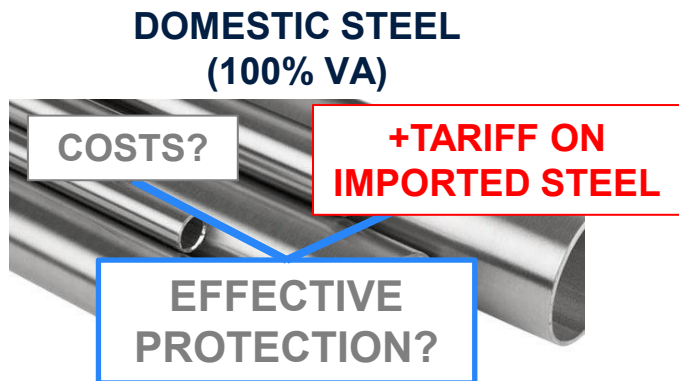
Assume that **tariffs on imported steel are raised**... How would that affect the **production costs** of the domestic engine industry? And of the domestic car industry?



VA: VALUE ADDED

EXAMPLES OF QUESTIONS THAT CAN BE ADDRESSED WITH UTAS

Assume that **tariffs on imported steel are raised**... How would that affect the **effective protection** of the domestic steel industry? And of the domestic engine and car industries?



DOMESTIC ENGINE
(80% STEEL, 20% VA)

THREE KEY CONCEPTS

1. Output tariff: tariff applied to the imported variety.

Example of the engine industry: the tariff applied to imported engines.

2. Upstream tariff: tariffs applied to inputs used to produce the good.

Example of the engine industry: the tariff applied to imported steel.

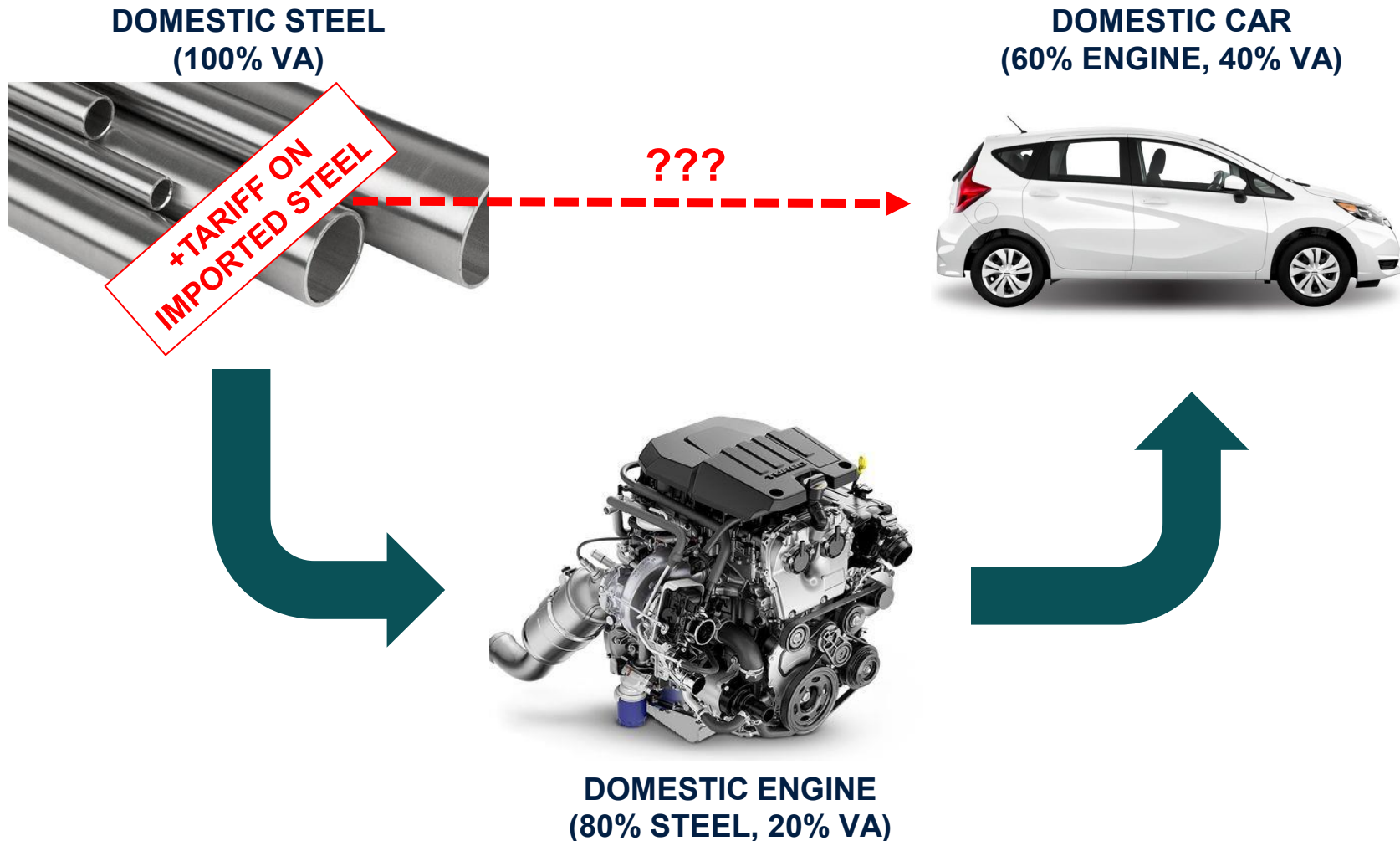
3. Effective protection: is the difference between the output tariff and the upstream tariff.

DIRECT AND INDIRECT INPUTS...

While the car does not use steel directly, it does have steel embedded in the engine...

Does a tariff on steel affect the cost of producing cars?

It depends on whether domestic and foreign engines are perfect substitutes or not...



VA: VALUE ADDED

UTAS offers two frameworks:

1. **PRODUCT HOMOGENEITY:** Domestic and imported inputs are perfect substitutes.

Example: the tariff on steel will not affect the cost of engines car manufacturers face (they can always buy the imported variety, which is unaffected by the tariff imposed on steel). Therefore, the cost of producing cars is not affected.

An industry's production costs are **only affected by direct inputs.**

2. **PRODUCT DIFFERENTIATION:** Domestic and imported inputs are imperfect substitutes.

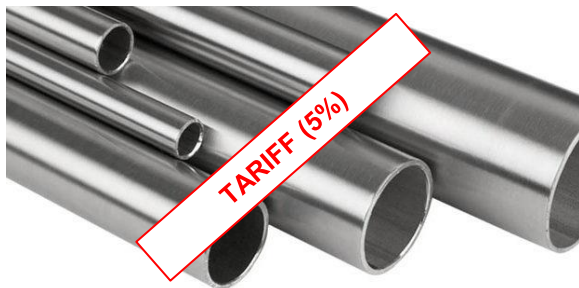
Example: the tariff on steel will affect the cost of imported engines, and therefore the cost of producing cars is affected.

An industry's production costs are **affected by direct AND indirect inputs.**

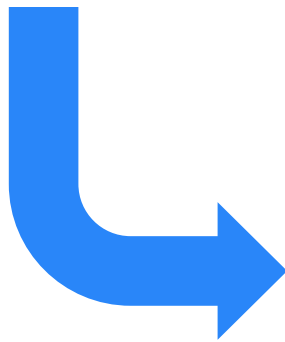
What inputs do we need to analyze the impact of a tariff reform on production costs and on effective protection?

- (1) **Tariffs (customs data)**
- (2) **“Structure” of the economy (input-output tables)**
- (3) **Parameters (chosen by the researcher)**

STEEL INDUSTRY
(100% VA)



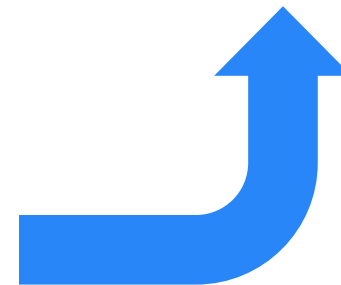
CAR INDUSTRY
(60% ENGINE, 40% VA)



An input-output table allows us to decompose each sector's output into intermediate consumption (inputs from other sectors) and value added by the sector



ENGINE INDUSTRY
(80% STEEL, 20% VA)



Parameters

Remember that for the product differentiation framework we needed to specify the **initial varieties mix**, the **substitution elasticity** and the **domestic variety's supply elasticity**.

FORMATTING OF THE **TARIFF SCHEDULE**

The tariff-schedule needs to be formatted in a specific way to load into UTAS

- **At HS 10, 8, or 6-digits**
- **HS codes should follow "XXXX.XXXXXX"
"XXXX.XXXX" "XXXX.XX" format.**
- **Tariffs in percentage points.**

**Researcher choice: nominal tariffs or
effectively applied tariffs (collected/imports)?**

Column A - HS product code	Column B - Baseline Tariff
"0101.2100"	7.7
"0101.2900"	3.0
"0101.3000"	0.0
"0101.9000"	4.7
"0102.2110"	0.0
"0102.2120"	5.0
"0102.2130"	0.0

INPUT-OUTPUT TABLES: WHAT ARE THEY?

Input-Output tables represent how different sectors in an economy depend one other via input-output relationships.

Input Sector \ Output Sector	Output sector 1	Output sector 2	...	Output sector N
Input sector 1	IC_{11}	IC_{21}	...	IC_{N1}
Input sector 2	IC_{12}	IC_{22}	...	IC_{N2}
...
Input Sector J	IC_{1J}	IC_{2J}	...	IC_{NJ}
Total intermediate consumption	$IC_1 = \sum_{j=1}^J IC_{1j}$	$IC_2 = \sum_{j=1}^J IC_{2j}$...	$IC_N = \sum_{j=1}^J IC_{Nj}$
Total value added	VA_1	VA_2	...	VA_N
Total industry Output	$Output_1$	$Output_2$...	$Output_N$

UTAS is **flexible** with respect to the industry classification that can be used, presenting three alternatives: GTAP, ISIC or NAICS.

However, the **data must be formatted in a specific way**: if there are N sectors (57 in the GTAP case), then the matrix should have N columns and N+3 rows (one row per sector + total intermediate consumption, total value added and total industry output).

Moreover, the **names of the industries must be exactly equal to the names UTAS uses** (they vary according to the classification chosen). **We will provide an Excel file with this information.**

CONCORDANCE FROM PRODUCTS TO SECTORS

Note that tariff data is available at the product level (e.g., HS 6 or 8 digit), while input-output tables are at the GTAP sector (industry) level.

THE UTAS TOOL MATCHES THE **TARIFF DATA AT THE PRODUCT LEVEL** WITH THE **SECTORS USING A CONCORDANCE**

TARIFF LINES (PRODUCT LEVEL)

100610 Cereals; rice in the husk
 ⋮
 720610 Iron or non-alloy steel; ingots
 720690 Iron or non-alloy steel; primary forms
 ⋮
 840731 Engines; reciprocating piston engines
 ⋮
 870332 Vehicles; w/ only compression-ignition...

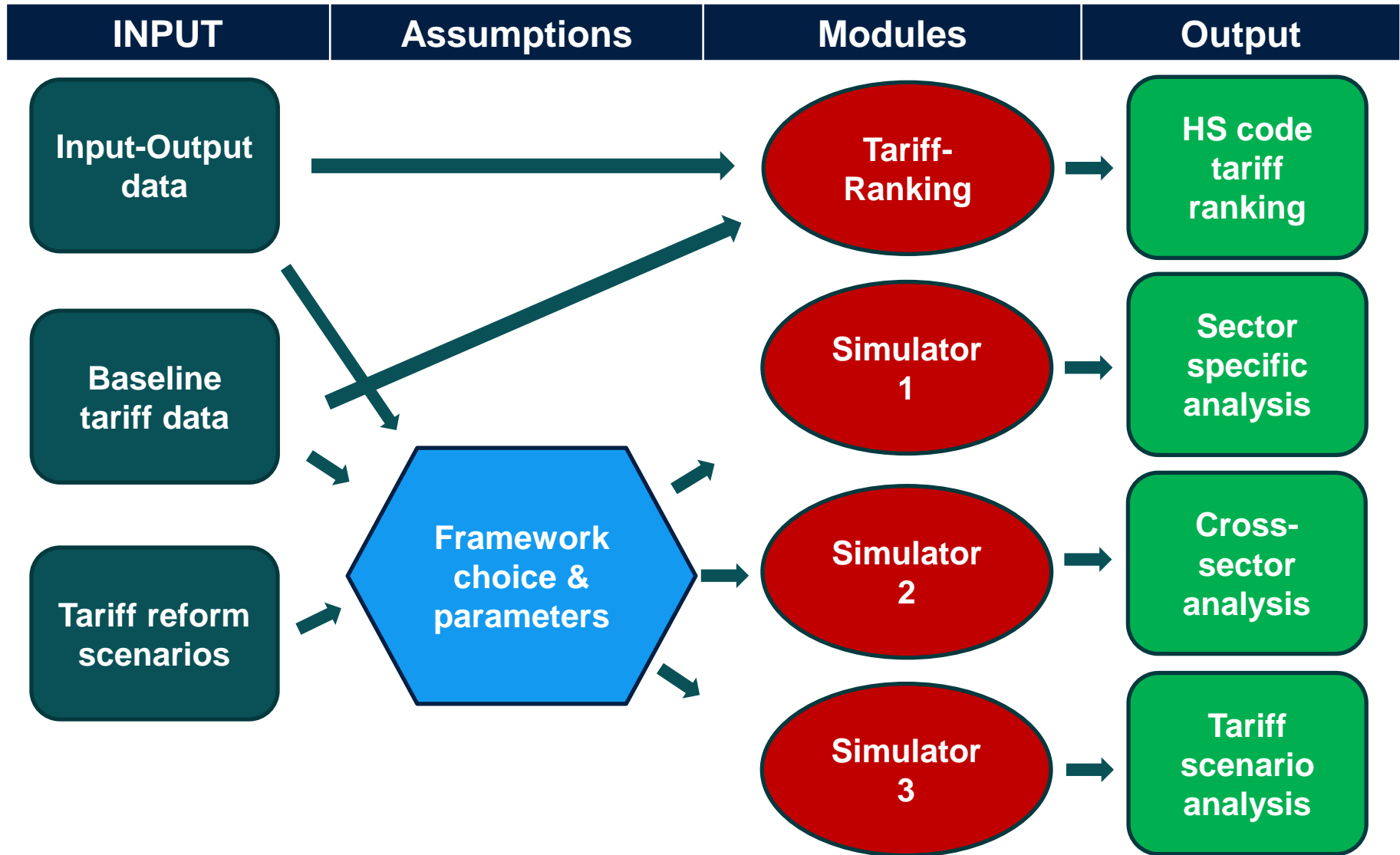


INDUSTRIES (GTAP)

PDR - Paddy rice
 ⋮
 I_S - Ferrous metals
 ⋮
 MVH - Motor vehicles and parts
 ⋮

Practical note. Unfortunately, there is no perfect match for the industries in our example (“Steel”, “Engine” and “Car”) and the 57 sectors available in GTAP (the IO table we have available for Pakistan). For example, both finished vehicles and car parts are classified in the same broad sector “Motor vehicles and parts” in GTAP. Moreover, steel products are classified in the broad category “Ferrous metals”. This is one of the **limitations of the tool**: the level of **disaggregation of the results will be limited by the sectors included in the classification chosen (GTAP in this case).**

STRUCTURE OF THE TOOL



SIMULATION MODULES

UTAS has four simulation modules that allow us to answer four different questions:

- **Tariff-ranking module:** What tariff lines of the HS tariff schedule have a particularly large impact on the cost structure in a prioritized sector?
- **SIM I module:** How does a change in input tariffs affect the cost structure and the effective protection in one specific sector?
- **SIM II module:** What is the impact of a change in input tariffs across several sectors?
- **SIM III module:** What is the impact of a change in the tariff schedule at the product level?