Department for Environment Food & Rural Affairs

Does flexibility of biofuel mandates have the ability to mitigate price spikes?

Modelling potential biofuel production reductions in the context of the recent invasion of Ukraine

Environment Agency

Forestry Commission

NATURAL ENGLAND

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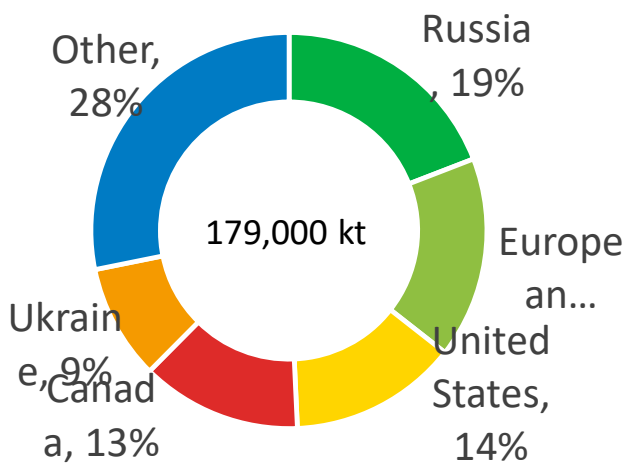
Invasion of Ukraine was a significant shock to global cereal and vegetable oil markets

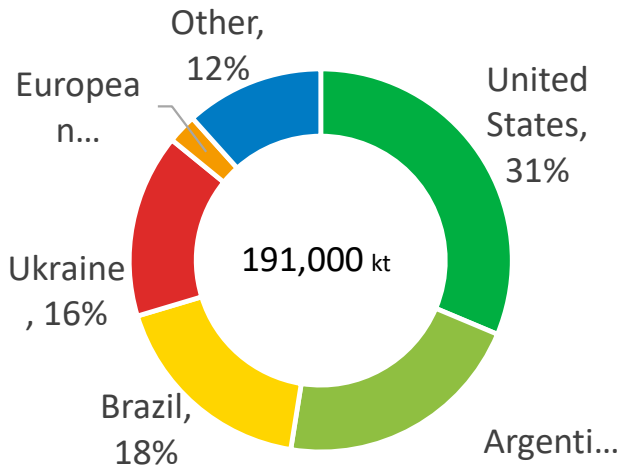
Global wheat exporters, 2018/19-2020/21

Source: USDA PSD, tonnes, EU excludes intra EU trade



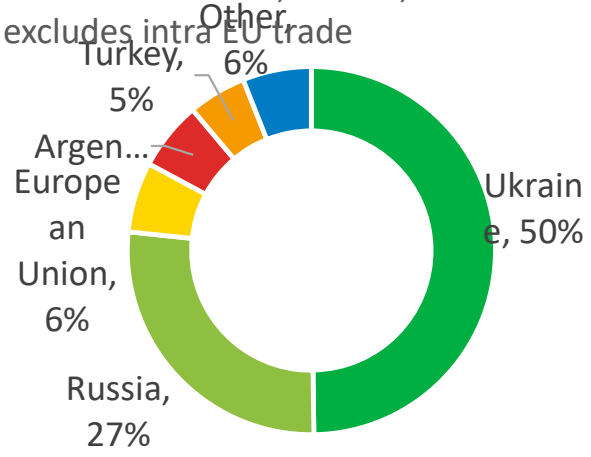
Global maize exporters, 2018/19-2020/21

Source: USDA PSD, tonnes, EU excludes intra EU trade



Global sunflower oil exporters, 2018/19-2020/21

Source: USDA PSD, tonnes, EU excludes intra EU trade



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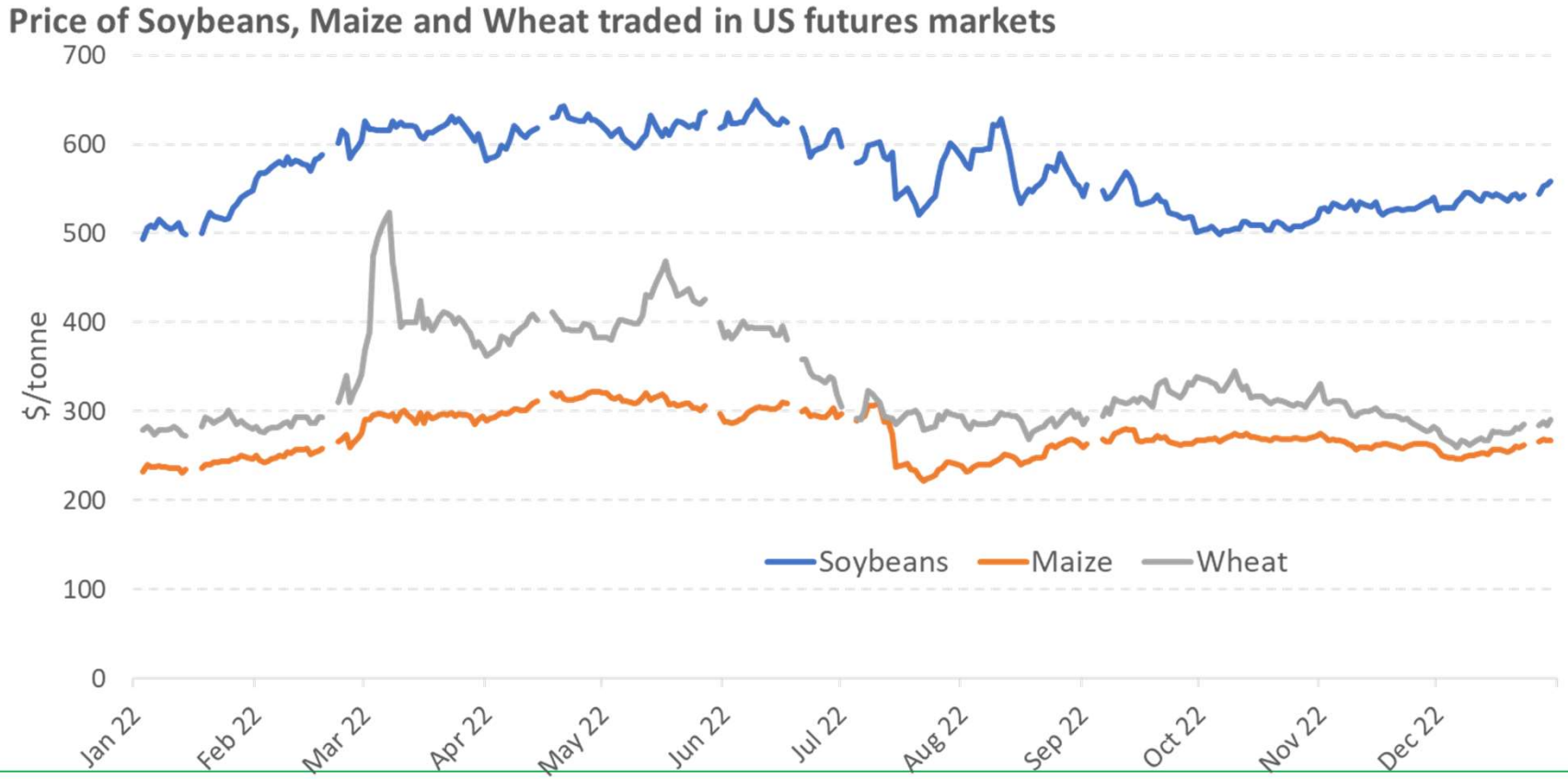
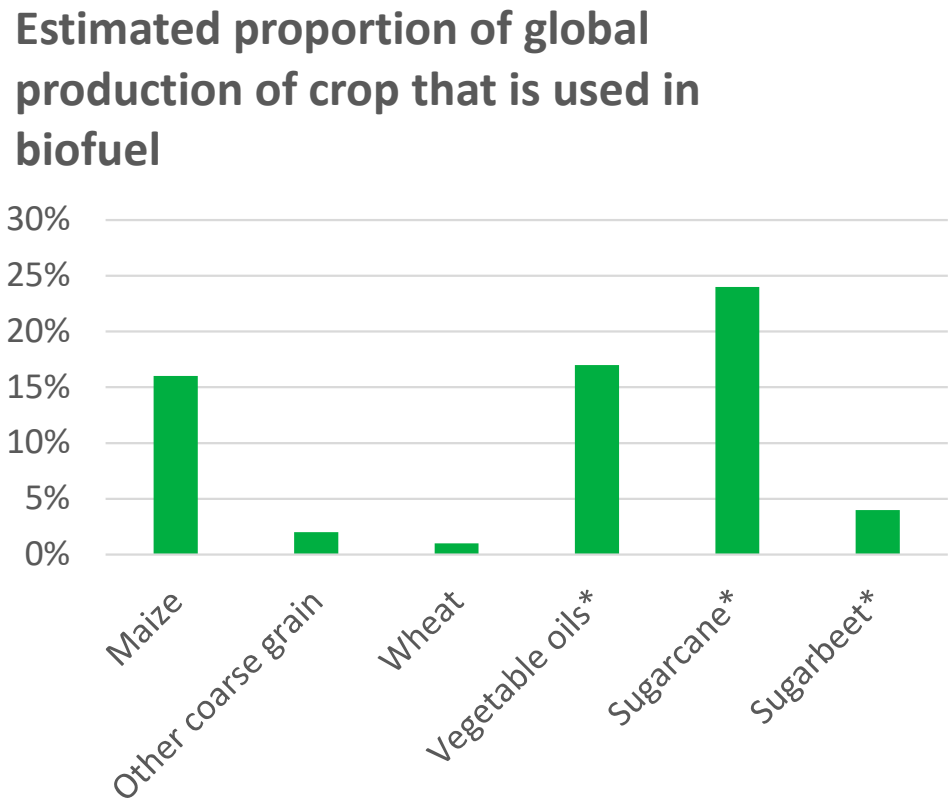


Biofuels are a significant source of demand

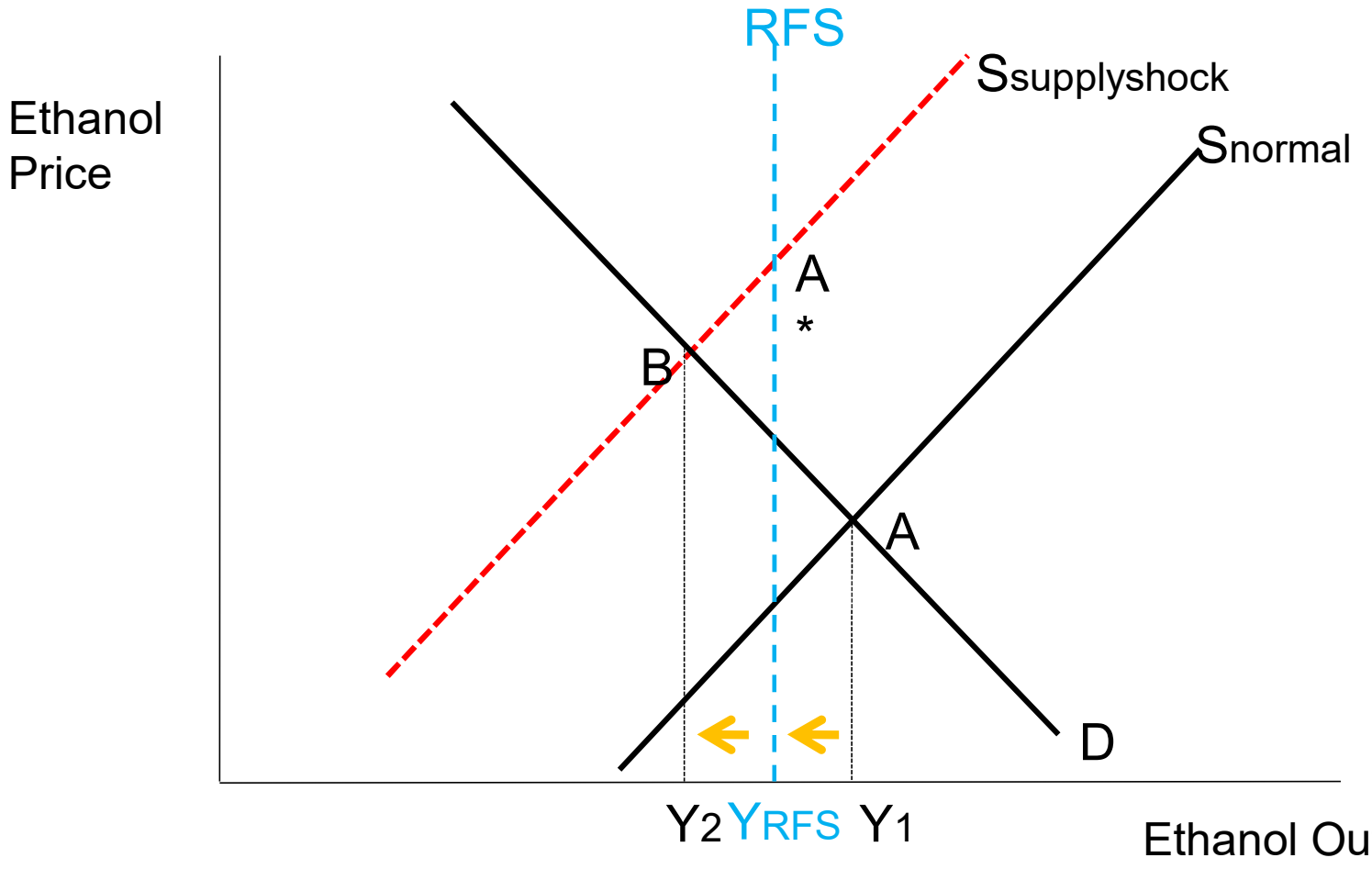
- For maize, sugar and vegetable oils a large portion of the crop is used in biofuel production.
- Other staple grains such as wheat and rice have lower biofuel usage.



Biofuels ability to mitigate price rises

- Biofuels have been proposed as a significant cause in previous price spikes.
- Likely not a significant cause in the price spike in 2022 but still can be used to mitigate the price rise.
- Effectively can act as additional stocks which become available during price spikes
- But globally biofuel mandates often stop this from happening

Mandates can stop demand from adjusting



A : Pre-shock

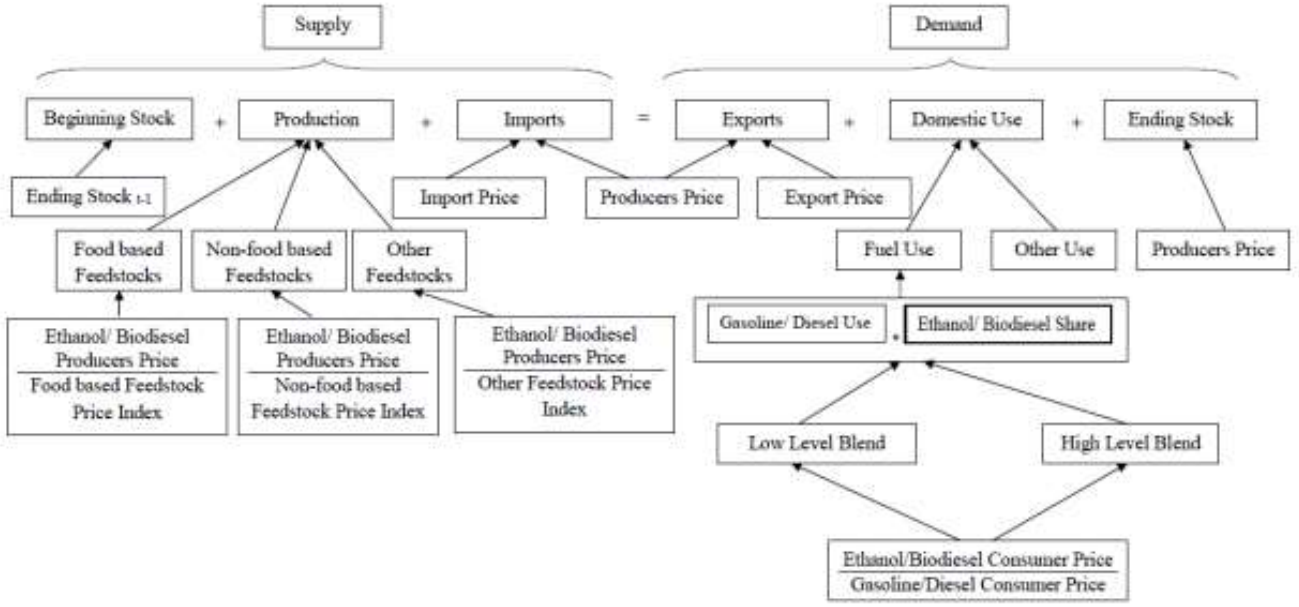
A*: Post shock with mandate

B : No mandate outcome

Aglink-Cosimo model

- A global agricultural partial equilibrium developed by the OECD and FAO.
- Dynamic-recursive annual model.
- Goods are homogenous.
- World markets clear through a global price.

Figure 6. Schematic diagram of the biofuels module of the Aglink-Cosimo



Scenario 1: New Aglink-Cosimo baseline

- Created to be commensurate with actual prices rises in futures markets in Spring 2020.
- Actual annual average for 2020 has been below this level but we're interested in biofuel's ability to mitigate price spikes

Factors	Scenario 1: Supply Shock
Trade disruption	50% reduction in RUS-UKR exports of wheat, maize and other coarse grains in 2022
Energy/Fertilizer Prices	Doubling of oil and fertilizer prices relative to baseline in 2022, forward curve thereafter
Biofuel Policy	Unchanged

Scenario 2: reduced use of bioethanol by G7 countries

- 10% reduction of biofuels in G7 countries (Includes the whole EU).

world price change relative to baseline	Scenario 1: RUS-UKR Supply shock	Scenario 2: RUS-UKR Supply shock + 10% cut in grain ethanol	mitigation effect* from cut in biofuel use
wheat	35%	31%	11%
maize	30%	19%	37%

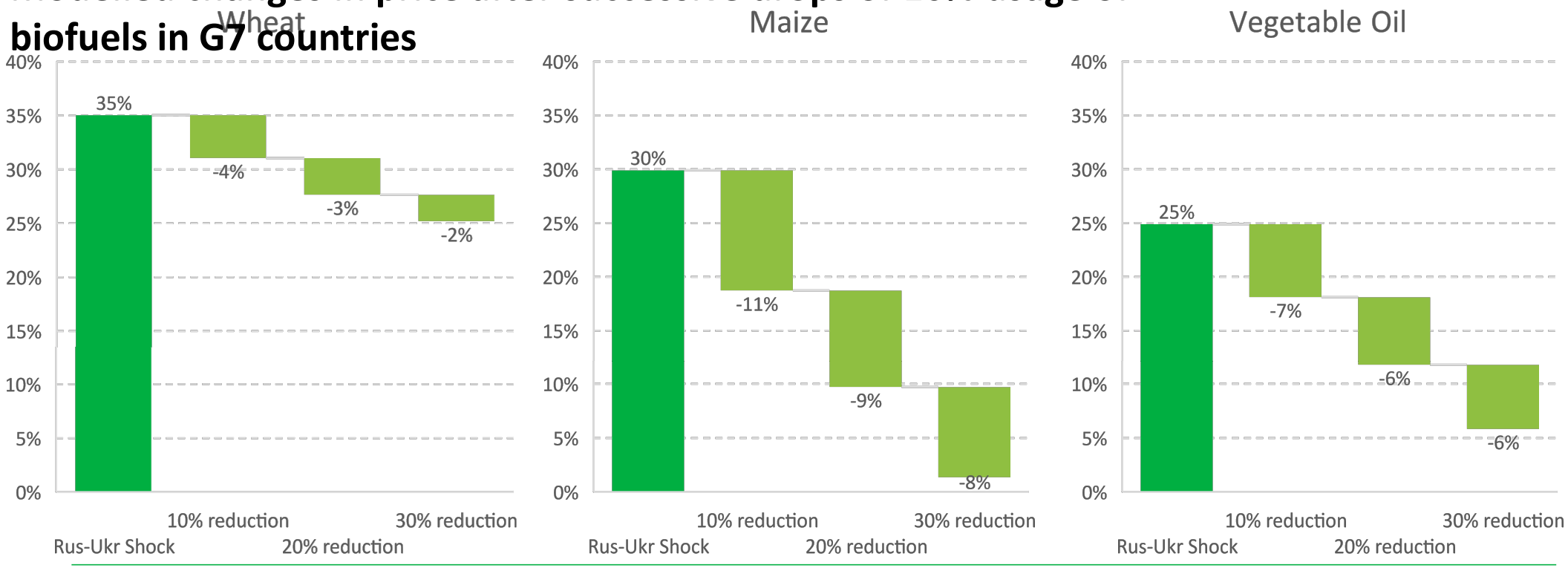
Scenario 3: Additionally reduced use of biodiesel by G7 countries

- Same as scenario 2 but in addition a 10% reduction in biodiesel.

World price change relative to baseline	Scenario 1: RUS-UKR Supply shock	Scenario 3: RUS-UKR Supply shock + 10% cut in ethanol and diesel	Mitigation effect* from cut in biofuel use
Soybeans	14%	10%	29%
Other Oilseeds	25%	19%	25%
Vegetable Oils	25%	18%	27%

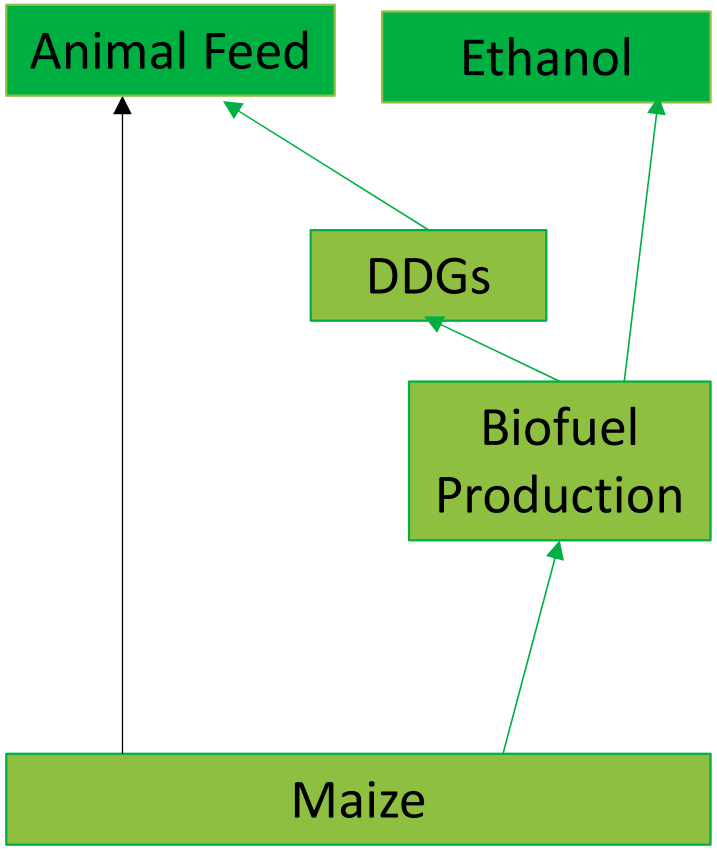
Further reductions have slightly diminishing marginal returns

Modelled changes in price after successive drops of 10% usage of biofuels in G7 countries



Importance of by-products from Biofuel?

- Biofuels create important by-products.
- The most significant of these is Dried Distiller's grains in the US.
- Replaces some but not all the nutritional value of directly feeding crops to animals and is accounted for in the model.



Importance of uses of crops

- Unlike the model crops are not perfectly homogenous
- The crops going into biofuels are generally of lower quality than for food consumption.
- However, “low” quality grains are still used in food manufacturing and there is substitution between.
- Milling grain prices and feed grain prices tend to move together though the milling premium is variable.

Conclusion

- If biofuel demand was to reduce during price spikes this could significantly reduce the size of price spikes, particularly in maize and vegetable oils.