

The impact of declining foreign demand for Australia's fossil fuels

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Issue

- The countries who currently buy Australia's fossil fuels are moving away from their use (Kemp et al 2021).
 - Coal exports could fall by a factor of four and LNG exports could fall by over 25%.
- Fossil fuels are a major export for Australia and still a major input to our electricity generation.
 - Fossil fuels accounts for over 1/4 of merchandise exports.
- The sector does not employ a lot of people, but those who it does employ earn high wages and for a key part of different regional economies.



Literature

- Fossil fuel resources have played an important part of prosperity when paired with strong institutions (Peszko et al 2020).
- Foreign demand shocks can have significant and heterogenous consequences (Dungey et al 2019).
- There are a number of policies that could be used to either:
 - A) ease the transition for those affected (Rosenberg 2010), and/or
 - B) control the decline in production in a socially optimal way (Day & Day, 2017)

Research question

- What are the potential impacts of declining foreign demand for Australia's fossil fuels?
- What policies will be most effective in ameliorating these impacts?
- Do these policies differ depending on what one is targeting (i.e. national welfare, incomes of the affected workers, etc.)
- To what factors are the answers most sensitive?



CGE analysis

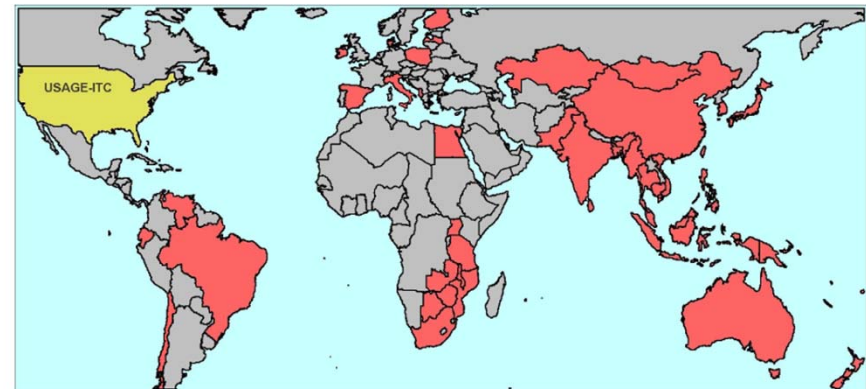
- CGE modelling is a good tool for demonstrating economic impacts.
- This is especially true when the impacts are prospective.
- For this set of questions, I need a model that has:
 - 1) a sufficient level of detail
 - 2) Australian data
 - 3) sufficient recognition
 - 4) is publicly available

The ORANI-G Page

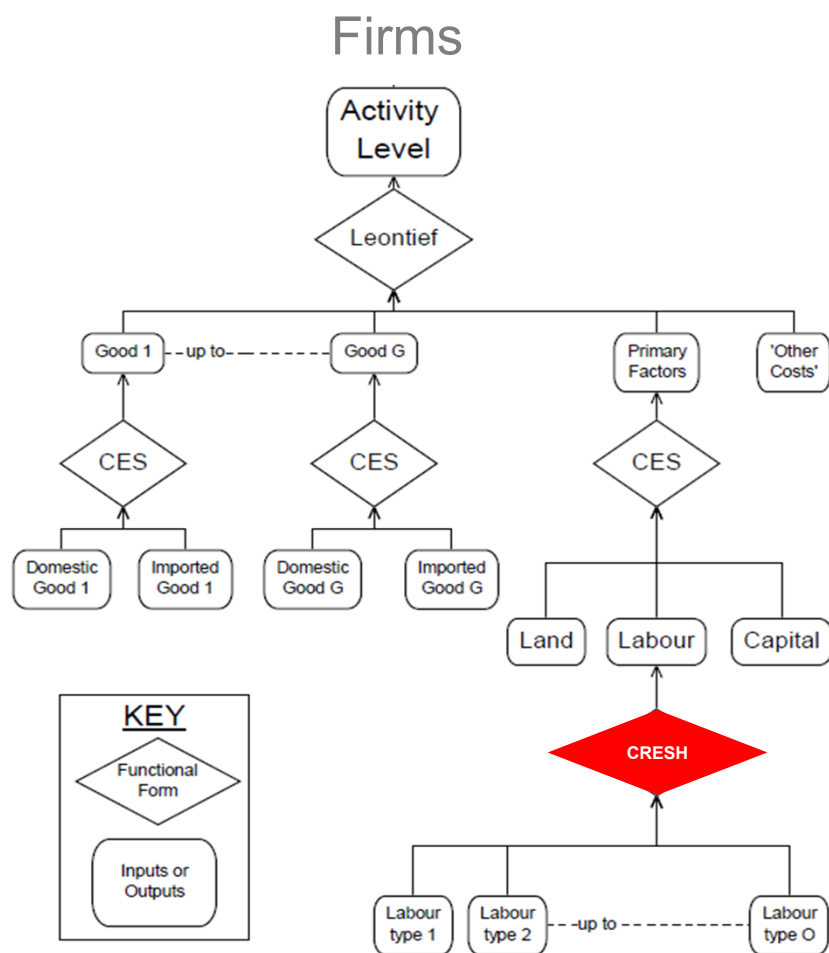
ORANI-G is an applied general equilibrium model which has been applied to many countries. It is descended from the ORANI GE model of the Australian economy which was used extensively for policy analysis in Australia for nearly two decades. ORANI-G (the 'G' stands for 'generic') is a version of ORANI designed both for teaching purposes and to serve as a basis from which to construct new models. Adaptations exist for many countries, including China, Thailand, South Africa, Korea, Pakistan, Brazil, the Philippines, Japan, Ireland, Vietnam, Indonesia, Venezuela, Taiwan and Denmark. COPS runs an annual [GE training course](#) which is based around the ORANI-G model, and also offers contract research services to assist or accelerate development of similar models worldwide.

This page gives access to various ORANI-G-related materials.

Prerequisite: Access to GEMPACK software and basic GEMPACK knowledge. See [here](#) for more introductory level material.

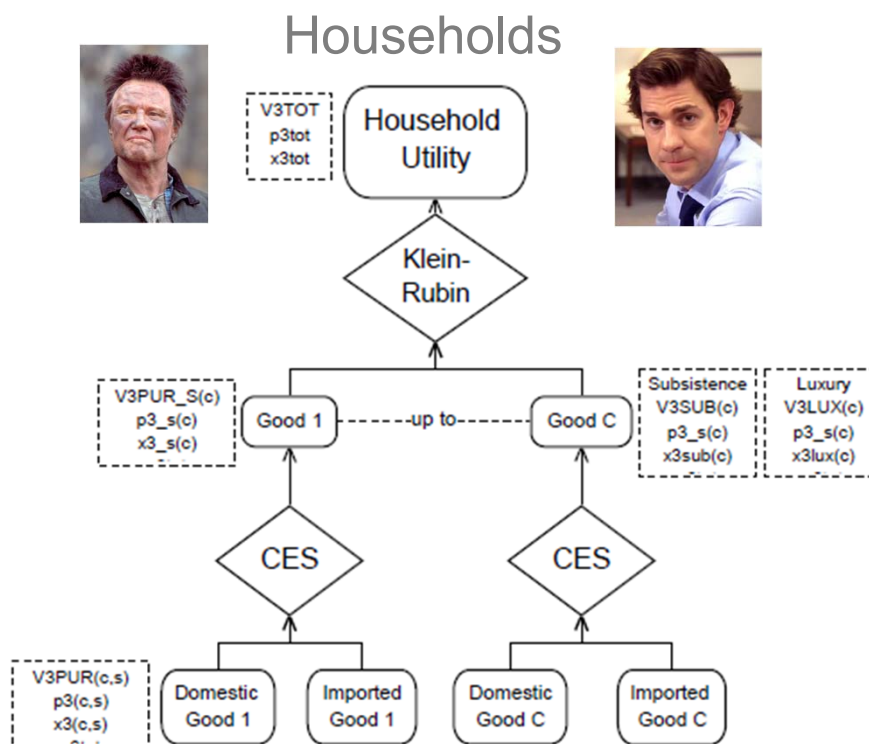


ORANI-G



Export demand

$$X4(c) = F4Q(c) \left[\frac{P4(c)}{PHI * F4P(c)} \right]^{EXP_ELAST(c)}$$





Data

USETABLE	1 Crops	2 Livestock	3 OtherAq	4 Coal	5 Gas	6 OtherMining	7 FoodMan	8 LightMan	9 AdvMan	10 HeavyMan	11 Utilities	12 ResidentialB
1 Crops	581.000000	3858.700001	1277.700000	0	0	0	6319.799988	19.100000	226.000000	51.599998	36.000000	140.700000
2 Livestock	179.100000	3104.199997	11.400000	0	0	0	31754.399994	689.000000	144.800000	0	0	0
3 OtherAq	3236.300000	3065.700001	1350.000000	20.000000	6.000000	170.000000	1210.800003	2636.400000	286.400002	9.300000	0	0
4 Coal	19.200000	0	0	94.000000	0	21.200000	12.000000	7.100000	55.500000	1303.800000	2176.799999	0
5 Gas	6.000000	41.600000	1.100000	47.700000	872.500000	322.400000	626.900002	366.300001	2204.000000	8202.299805	1927.699997	79.200000
6 OtherMining	0.400000	0.600000	0	6648.000000	1123.200001	9745.799999	60.700000	49.100000	616.200001	45462.500000	31.600000	142.400000
7 FoodMan	23.800000	1660.500000	254.100002	29.800000	45.600000	147.400002	15774.199951	285.800000	471.699997	41.100000	140.100000	15.400000
8 LightMan	42.900000	103.400002	113.400002	134.000000	104.900002	326.299988	1842.500000	5689.699951	2066.099976	529.600006	436.800018	7939.800049
9 AdvMan	1118.799988	3707.300049	1243.299988	3034.400024	1204.700012	7593.399902	2288.199951	2623.699951	26340.000000	3094.000000	3944.300049	8797.800049
10 HeavyMan	953.000000	1424.300049	952.500000	2804.500000	514.000000	4989.500000	597.800003	714.700012	12090.600098	6161.800049	1128.099976	5168.800049
11 Utilities	964.000000	1417.100000	108.000000	479.000000	2088.200000	3621.300000	1797.000000	1168.000000	3220.000000	4202.300000	32516.900000	1081.200000
12 ResidentialB	0	0	0	0	0	0	0	0	0	0	0	0
13 NonResBuilCn	0	0	0	0	0	0	0	0	0	0	0	0
14 HeavyCivilEn	71.000000	234.000000	7.000000	296.000000	107.000000	1547.000000	0	1.000000	0	11.000000	102.000000	0
15 Construction	553.000000	1447.000000	251.000000	839.000000	2121.000000	6026.000000	3.000000	829.000000	76.000000	63.000000	4499.000000	30207.000000
16 WholesaleTra	616.600000	1534.000000	707.900000	1059.600000	378.700000	2509.300000	4291.500000	1779.100000	6152.500000	1242.000000	1128.000000	3229.000000
17 RetailTrade	101.000000	77.000000	36.000000	88.000000	31.000000	177.000000	145.000000	290.000000	318.000000	64.000000	136.000000	185.000000
18 AccomFood	133.000000	165.200001	37.700000	791.500000	287.299995	694.300003	940.200005	226.599998	980.100006	505.200012	400.900002	75.500000
19 RoadTranspor	331.500000	1543.800000	271.000000	518.900000	112.600000	1424.500000	4367.500000	2250.800000	2873.900000	2768.400000	532.700000	1369.900000
20 RailTranspor	37.000000	49.000000	3.000000	1297.000000	30.000000	839.000000	95.000000	20.000000	138.000000	603.000000	263.000000	13.000000
21 WaterPipelin	0	7.100000	1.900000	17.400000	135.500000	135.900001	100.300000	70.200000	401.900000	387.000000	363.200000	54.800000
22 AirSpaceTran	33.800000	50.000000	11.700000	112.700000	60.600000	249.000000	126.900002	79.600000	378.300003	70.000000	224.300003	97.200000
23 Othertrans	220.000000	1242.200000	115.000000	1171.600000	491.200000	1018.099999	1101.100000	753.000000	3228.100000	617.900000	275.600000	525.000000
24 Comms	64.300000	66.800000	32.800000	237.700000	192.600000	333.500000	544.600000	730.299999	2900.800003	1021.100002	1302.099998	895.099998
25 Finance	1857.900002	3271.300003	577.400000	1742.000000	5862.700005	4164.099998	1952.900002	558.600000	2288.699997	968.700001	14145.600006	2252.599998
26 RHR	442.299999	822.799999	562.299999	1233.799999	2207.099998	4346.500000	986.200001	739.299999	2892.500000	1742.800003	1415.700001	2067.299999
27 Dwellings	0	0	0	0	0	0	0	0	0	0	0	0
28 PSTS	1683.599998	2059.099998	655.299999	2083.800003	511.000000	10769.599976	2623.000000	2253.699997	9901.299988	2050.399994	6769.899994	4422.700012
29 OthServ	457.500000	1731.100000	778.100000	1845.700000	1446.300000	6430.900000	2689.900000	1809.900000	3740.800001	2390.600000	3208.700000	2145.200000
30 PAdminDef	41.700000	35.500000	38.600000	491.000000	254.900000	1232.299999	253.100000	277.300000	1338.700000	316.300000	346.100000	872.100000
31 Education	2.000000	2.000000	1.000000	31.300000	22.200000	56.500000	40.200000	17.100000	98.700000	50.400000	120.000000	23.200000
32 Health	0	0	8.000000	0	0	2.000000	30.100000	39.100000	320.800000	17.000000	4.000000	0
33 RecServ	0	7.100000	5.400000	65.500000	70.200000	155.900000	1.000000	6.300000	20.100000	4.200000	79.200000	126.600000
34 Waqes	2773.000000	3562.000000	3027.000000	6713.000000	4617.000000	19754.000000	16801.000000	10145.000000	30935.000000	9360.000000	14896.000000	8647.000000
35 GOS	9219.000000	17003.000000	4118.000000	26400.000000	50186.000000	93894.000000	10544.000000	5599.000000	19967.000000	8575.000000	28940.000000	11504.000000
36 IND TAX	421.000000	722.000000	279.000000	57.000000	109.000000	609.000000	729.000000	458.000000	1619.000000	477.000000	353.000000	367.000000
37 PTAX	-34.000000	200.000000	-130.000000	393.000000	240.000000	1089.000000	154.000000	-456.000000	-5.000000	322.000000	3533.000000	-163.000000
Total	26149.699987	54215.400099	16706.599990	60776.900026	75433.000013	184394.699866	110803.799900	42725.799910	138286.500071	102685.299871	125376.300043	92281.500155

Closure

I've employed a long-run comparative static closure in which:

- The nominal exchange rate serves as numeraire.
- All taxes, shifters and productivity variables are exogenous.
- The rate of return and level of employment are assumed to be fixed.
- The balance of trade to GDP is swapped for the level of household consumption and government consumption is exogenous.

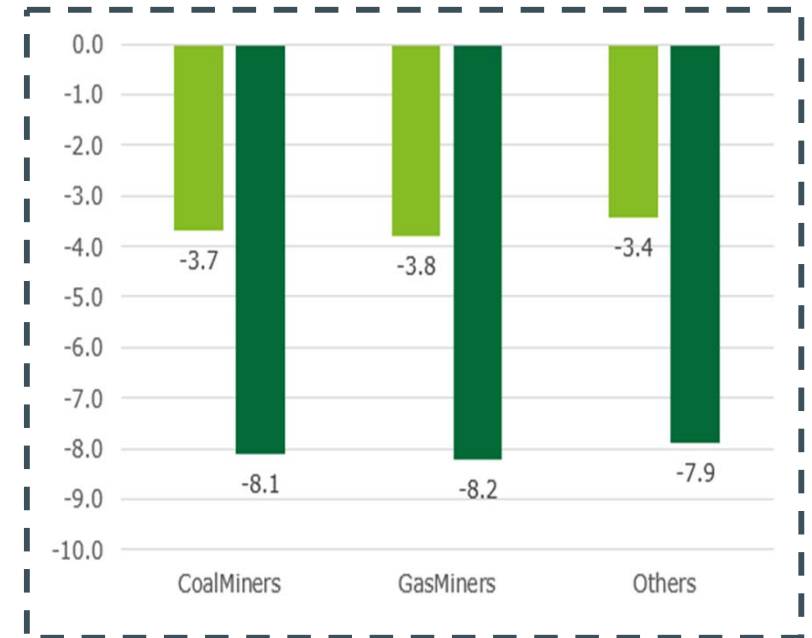
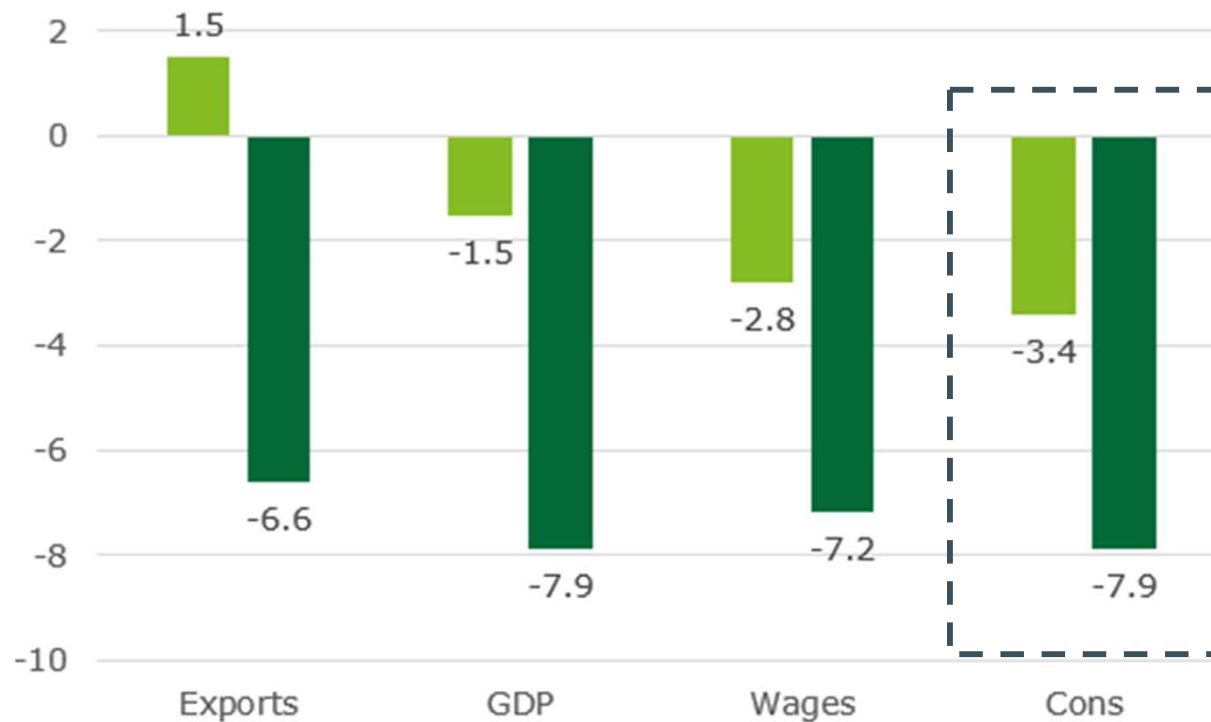
Policy

My core simulation is a 90% decline in foreign demand for coal, and a 25% decline for gas (consistent with Kemp et al 2021).

I will also examine different compensating policies, including:

- A lump-sum transfer.
- Export subsidies for growth industries.
- Other things that get suggested to me.

Results



Next steps

This work can be refined and expanded:

- Further calibration of parameters (especially for labour-mobility)
- Refine the government finance module
- More detailed treatment of households (use ATO data to inform non-labour income shares)

References

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