Technical annex

Figure 1 is based on the simulations from Ramey (2020) – see table A1. 'Ramey low existing capital stock' refers to the simulations with a situation with low steady state investment (1.5 per cent of GDP), using the average of the Neoclassical and New Keynesian macro models. 'Ramey high existing capital stock' refers to a situation with high steady state investment (3.5 per cent of GDP). The UK is much closer to the latter, with an average PSNI of 2.0 per cent of GDP since the 2000/01. We assume that these nominal GDP gains (shown in undiscounted integral column) are evenly distributed over a 25 year horizon, which is an assumed average asset lifetime suggested by the OBR (2024), on page 15 – though this will obviously hugely vary depending on the asset. We assume a public capital elasticity of 0.1, in line with the OBR. For the first two years, we assume the average of the Neoclassical and New Keynesian multipliers from Ramey – see table A2. Note that this short time multiplier assumption is smaller than that of the OBR.

Table A1: Long-run multipliers from simulated models

Model Version	Present Discounted Value		Undiscounted Integral	
	Neoclassical	New Keynesian	Neoclassical	New Keynesian
Govt consumption	0.44	0.89	0.43	0.90
	Initial Steady State: Govt Investment/GDP = 3.5%			
No delays				
Govt investment, $\theta_G = 0.05$	1.3	1.8	2.4	3.0
Govt investment, $\theta_G = 0.10$	2.2	2.8	4.3	5.0
6-qrt time to spend & build				
Govt investment, $\theta_G = 0.05$	1.3	1.7	2.4	2.9
Govt investment, $\theta_G = 0.10$	2.1	2.5	4.3	4.9
	Initial Steady-State: Govt Investment/GDP = 1.5%			
No delays				
Govt investment, $\theta_G = 0.05$	2.4	3.2	4.9	5.4
Govt investment, $\theta_G = 0.10$	4.4	5.4	9.3	9.8
6-qrt time to spend & build				
Govt investment, $\theta_G = 0.05$	2.3	2.9	4.9	5.3
Govt investment, $\theta_G = 0.10$	4.1	5.0	9.3	9.7

Notes: These estimates are based on the calibrated models described in Section 2. The multipliers are equal to the ratio of the integrals of the impulse responses of output and appropriations. PDV is present discounted value, integral is undiscounted. The top panel shows multipliers from simulations for which the steady-state government investment to GDP ratio is 3.5%, which matches the data. The bottom panel shows multipliers from simulations for which the steady-state ratio is 1.5%.

Table A2: Short-run multipliers from simulated models

Model Version ($\theta_G = 0.05$)	Govt consumption AR(1)	Govt investment AR(1)	Govt investment delays
Neoclassical Model			
Baseline	0.47	0.40	0.37
Frisch elasticity = 0.5	0.14	0.13	0.13
Invest. adj. cost, capital utiliz.	0.63	0.63	0.15
New Keynesian Model			
Baseline	1.06	1.12	0.08
No invest. adj. cost, no utiliz.	0.19	0.16	0.06
Frisch elasticity = 0.5	0.76	0.82	-0.20
No rule-of-thumb households	0.68	0.73	-0.05

Notes: These estimates are based on the calibrated models described in Section 2. The multipliers are equal to the ratio of the integrals of the impulse responses of output and appropriations.

Note that this is modelled on 'productive capital stock increase' by the government. The actual composition of the increase in investment is crucial here – eg student loan write offs would count as investment but do not increase the productive capital stock, while railway investments would.