WORKING PAPER 2107

The Macroeconomics of Government Spending: Distinguishing Between Government Purchases, Government Production, and Job Guarantee Programs

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June 2021

POST-KEYNESIAN ECONOMICS SOCIETY

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Abstract

This paper reconstructs the Keynesian income – expenditure (IE) model to include distinctions between government purchases of private sector output, government production, and government job guarantee program (JGP) employment. Analytically, including those distinctions transforms the model from a single sector model into a multi-sector model. It also surfaces the logic behind the automatic stabilizer property of JGP employment. The model is then extended to include Kaleckian income distribution effects which contribute to explaining why expenditure multipliers vary by type of fiscal expenditure. The Kaleckian version generates a new balanced budget multiplier driven by changed composition of government spending. It also illuminates some macroeconomic implications of privatization of government produced services.

Keywords: Government spending, government production, balanced budget multiplier, automatic stabilizers, job guarantee program
JEL ref.: E10, E12, E62.

May 2021

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1. Introduction: updating the macroeconomics of government spending

Government spending is a significant component of aggregate demand (AD). In years to come, it may increase considerably owing to revived political interest in infrastructure renewal and the need for new infrastructure to meet the challenge of climate change. There is also political interest in more spending to meet healthcare and education needs.

This paper seeks to update Keynesian macroeconomics so as to include different types of government spending. The paper introduces distinctions between conventional government spending (i.e. procurement of private sector output), government production (e.g. education and municipal services), and government job guarantee program (JGP) employment. Those different types of spending are included in the canonical Keynesian

income - expenditure (IE) model (Samuelson, 1948), which is then further amended to include Kaleckian income distribution effects. The exercise confirms the enduring value of the IE model and yields non-trivial findings. What is theoretically clear *ex-post* is not obvious *ex-ante*. The exercise also yields important policy and political insights regarding the privatization debate and government employment programs.

Modifying the Keynesian IE model improves it analytically. In particular, it transforms the conception of government. The standard IE model is a one sector model in which government spending is a component of AD. Distinguishing between types of government spending transforms the model into a multi-sector model.

As regards government spending multipliers, the big analytical impact comes with the introduction of Kaleckian income distribution effects. The Kaleckian version of the reconstructed IE model generates two different government spending multipliers, one for purchases of private sector output and one for public sector produced output. The latter is shown to be larger. It also generates a novel Kaleckian balanced budget multiplier based on changing the composition of government spending.[1] From a Keynesian perspective, the two critical channels generating differences in government expenditure multipliers are the structure of production (i.e. the production function) and income distribution effects.

The focus of the paper is macroeconomics, which means it is concerned with government spending's impact on aggregate demand (AD) and the determination of output and employment. That is different from neoclassical welfare economics, the concerns of which are not addressed in the current paper. Macroeconomics is concerned with aggregate output and employment. Welfare economics is concerned with utility. In

[1] The original balanced budget multiplier was introduced by Samuelson (1948) and rests on the differential aggregate demand impact of increased government spending and increased taxes.

macroeconomics, government provided public goods show up at their cost of production. In welfare economics they have magnified standing as they are simultaneously consumed by many, which increases their utility contribution.

Likewise, the paper is not concerned with the implications of public investment for the public capital stock. That is a concern of growth theory in which public investment may impact the growth path. Instead, the current focus is exclusively on the short run employment and output implications of government spending.

The structure of the balance of the paper is as follows. Section 2 provides a brief literature placement review. Section 3 presents the canonical Keynesian IE model which benchmarks the paper. Section 4 adds government production to the Keynesian IE model. Section 5 adds JGP employment to the Keynesian model with government production. Section 6 presents the canonical Kaleckian IE model. Section 7 adds government production to the Kaleckian model, and Section 8 adds JGP employment. Section 9 concludes the paper.

2. Brief literature placement review

In the wake of the Great Recession of 2008-09 there has been significantly revived interest in fiscal policy and the size of the government spending multiplier. That interest has been further amplified by the 2020 Covid-19 recession. Keynesian economics has always believed in the efficacy and value of fiscal policy. Now, mainstream economics has also come substantially on board, significantly downgrading the standing of the New Classical critique of fiscal policy which had emerged in the 1970s.

The revival of fiscal policy has involved three main areas of discussion. The first is the theory of fiscal policy effectiveness. Since Keynesians always believed in

effectiveness, they have contributed little to this debate. Instead, the debate has largely been within the mainstream, with New Keynesians criticizing the neo-Ricardian hypothesis (Barro, 1974) and augmenting the type of arguments made long ago by Buiter and Tobin (1979).[2] Additionally, some New Classicals have also embraced the effectiveness of fiscal policy on grounds of the zero lower bound to nominal interest rates (Christiano, L. et al., 2011). However, that embrace is conditional on the economy being in deep recession, with the nominal interest rate at its zero floor.

The second area of debate concerns empirical assessment of the size of the government spending multiplier. In turn, that debate can be decomposed into two parts. One part concerns counter-cyclical variation in the size of the government spending multiplier. The other concerns differences in the size of the multiplier by expenditure type.

Auerbach and Gorodnichenko (2012) provide an important mainstream empirical contribution regarding counter-cyclical variation of the government spending multiplier, while Fazzari et al. (2015) provide an important Keynesian empirical contribution. Aschauer (1989, 1990) provided an early contribution to the empirical debate over multiplier's by expenditure type, and Auerbach and Gorodnichenko (2012) provide additional evidence. However, that empirical literature illustrates how issues bleed into each other, as Aschauer (1989, 1990) reports government non-military investment expenditures have the largest impact. That likely reflects a combination of both the short run Keynesian AD impact plus the long run public capital accumulation impact. Theoretical analysis can artificially separate the short and the long run, but the two

[2] In the 1960s, Monetarism provided an earlier critique of fiscal policy effectiveness that centered on the issue of interest rate crowding-out. For a discussion and rejection of that critique see Tobin (1979).

inevitably bleed into each other in empirical work. Lastly, there has also been some Post Keynesian theoretical work seeking to explain counter-cyclical variation of the government expenditure multiplier (see Setterfield (2019) and references therein).

The third area of debate has been theoretical modelling of the composition of government spending, with an eye to explaining why expenditure multipliers may differ by expenditure type. Here, mainstream economics has significantly elaborated the dynamic stochastic general equilibrium (DSGE) model to include different types of government spending (see Cortuk (2013) and Cortuk and Güler (2013), and references therein). In contrast, there has been little contribution from Keynesians on these issues, and the purpose of the current paper is to fill that lacuna.

The DSGE model assumes market clearing (subject to the caveat of Calvo (1983) staggered price setting by firms) and AD is not a constraint on economic activity. In that world, government spending works via household utility functions and the government production function, triggering changes in the array of current and inter-temporal margins of choice for households and firms. Those changes then cause changes in the level of private sector economic activity.[3]

[3] In the DSGE framework, government produces output which provides utility to households. Government output can be a substitute or complement with private consumption goods. The government production function uses public sector capital and government workers, with government production being paid for by taxes and deficits. Government choices about the level of government production ramify throughout the DSGE model. For instance, the labor market is impacted via demand for government workers and induced changes in household labor supply. The goods market is impacted via government demand for investment goods. The goods market is also impacted via increased consumption demand from government workers. Goods market demand is further impacted via household utility functions, with the sign of the impact depending on whether government production is a substitute or complement with private consumption. There are also standard fiscal impacts, related to taxes and deficits. The multiplier from tax financed spending depends on the marginal benefit from increased government activity versus the tax drain effect. The multiplier from bond financed spending depends on the extent to which inter-temporal consumption choices are altered by the prospect of more government economic activity today versus higher future taxes to repay debt incurred to finance that activity. Staggered price setting by firms means there is some slack in the economy, which means monetary policy can have real effects.

The Keynesian analysis presented below works according to fundamentally different economic logic. Private sector production is constrained by the level of AD, and government spending increases AD. The key to the Keynesian approach is that different types of spending have different impacts on AD. However, what is less understood, is the channel for those different AD impacts is income distribution. As shown below, that channel is actually missing in the canonical Keynesian model, which is why it has difficulty delivering differentially sized government spending multipliers.

3. The Keynesian IE model

The starting point is the standard Keynesian IE model (Samuelson, 1948). Though well known, the model is reproduced below because it provides the benchmark from which subsequent analysis pivots. Comparison with the benchmark model makes clear what is needed to generate Keynesian differentially sized government spending multipliers.

The equations of the benchmark model are given by

(1) $Y = E$

(2) $E = D + G$

(3) $D = C + I$

(4) $C = A + b[1- t][y + T]$ $\quad 0 < b < 1, 0 < t < 1$

(5) $Y = aN$ $\quad a > 0, N \leq N^F$

(6) $p = [1 + m]w/a$

Y = output, E = aggregate demand, D = private sector demand, C = consumption spending, I = investment spending, G = government spending, A = autonomous consumption spending, b = propensity to consume, t = income tax rate, T = transfers, a = labor productivity, N = employment, N^F = labor supply, p = price level, m = mark-up, w =

private sector wage. All quantity variables are in real terms. Investment and government spending are exogenously given.

Equation (1) is the goods market equilibrium condition. Equation (2) is the definition of AD. Equation (3) is the definition of private sector demand. Equation (4) is the consumption function.[4] Equation (5) is the aggregate production function. Equation (6) determines the price level and has firms charging a mark-up over unit labor costs. The setup of the model distinguishes between AD (E) and private sector demand (D). AD is total demand received by firms. Private sector demand is the goods demand of private sector agents (i.e. households and firms). Furthermore, in the benchmark model, government spending is exclusively procurement of goods produced by private sector firms.

Solving the model yields the following solutions for output and employment:

(7) $Y^* = \{A + b[1 - t]T + I + G\}/\{1 - b[1 - t]\}$

(8) $N^* = Y^*/a$

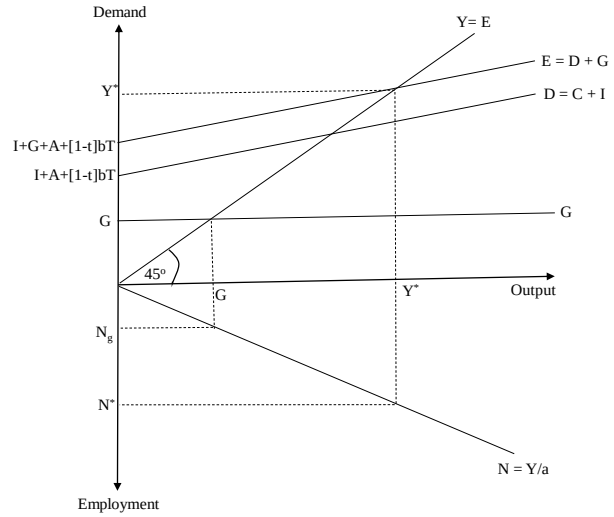
The appendix shows the output and employment multipliers for government spending and transfer spending.[5] Figure 1 illustrates the model. The upper panel of Figure 1 shows the familiar Keynesian cross diagram, while the lower panel shows the production function. Equilibrium output (Y^*) generates total employment of N^*. Employment directly due to government spending (G) is N_g. Employment due to private demand is $N^* - N_g$. Of that, $b[1 - t]G/\{1 - b[1 - t]\}a$ is employment induced by the multiplier effect

[4] The specification of the consumption function has transfer payments being subject to income tax, but this need not be the case.

[5] As is well known, the transfer spending multiplier is smaller because transfer spending only impacts output and employment indirectly via the filter of consumption spending, whereas government spending adds directly to demand for private sector output which immediately spurs private sector production and employment.

resulting from government spending. Thus, government spending generates output and employment both directly and indirectly.

Figure 1. The Keynesian cross diagram and production function for the benchmark IE model.



An important feature of the model is that government spending is a component of AD. In Figure 1 this is captured by the demand functions being stacked on top of each other. G represents government's demand for output. D represents the private sector's demand for output. E represents AD, which is the sum of the government's and the private sector's demands for output.

4. The Keynesian IE model with government production: a two sector interpretation

The standard IE model has all government spending being purchases of private sector output, and it makes no mention of government employment and production. Consequently, the model is silent on the economics and policy implications of such production. This section remedies that omission. The effect is to transform the model into a two sector model.

Introducing government production requires changing the definition of national income and the goods market clearing condition, which subtly changes the structure and logic of the model. The new structural equations are given by:

(9) $Y = Y_P + Y_G$

(10) $N = N_P + N_G$

(11) $Y_P = E$

(12) $G = G_P + G_G$

(13) $E = C + I + G_P$

(14) $Y_G = G_G$

(15) $G_G = w_G N_G/p = \omega_G N_G$

Y = aggregate output, Y_P = private sector output, Y_G = government output, N_P = private sector employment, N_G = government employment, G = total government spending, G_P = government spending on private sector output, G_G = government spending on government produced output, w_G = government sector nominal wage, ω_G = government sector real wage.

Equation (9) redefines aggregate output to include both private sector and government sector production. Equation (10) is the definition of aggregate employment, which consists of private sector and government sector employment. Equation (11) is the private sector goods market clearing condition which requires private sector output equal demand for private sector output. Equation (12) has total government spending equal government spending on private sector goods plus spending on public sector production. Equation (13) defines aggregate demand for private sector output. The government contribution to private sector demand is equal to government spending on private sector

goods. Equation (14) has government output equal to government spending on public sector produced output. Lastly, equation (15) determines the value of public sector output which is equal to the public sector wage bill. Initially, it is assumed the public sector nominal wage equals the private sector wage so that $w_G = w_P$.

There are four noteworthy features of the model. First, and foremost, the economy is now represented as a two sector economy. That is reflected in the fact that there are different types of output and different output determination conditions.

Second, there is a standalone private sector goods market equilibrium condition which is distinct from the national income identity. Goods market clearing requires AD for private sector goods equal private sector output. Private sector output is constrained by AD for private sector output, while public sector output is constrained by government spending on public production (i.e. public employment). That structure renders the national income identity an accounting relation, and not an equilibrium condition.

Third, the productive contribution of the government sector to national output is the value of the public sector wage bill. That reflects the fact that public sector output is not sold and is therefore valued at cost. The assumption is that the cost reflects the implicit market value of government sector output. The implication is increasing government wages and holding government employment constant, increases government output. That illustrates the difficulty of measuring government production.

Fourth, government production changes the consumption function by introducing income from the government sector. The consumption function is now given by

(16) $C = A + b[1- t][Y_P + \omega_G N_G + T]$ $\quad 0 < b < 1, 0 < t < 1$

The new feature is that households also receive the public sector wage bill as income.

That contrasts with the benchmark IE model in which there is only private sector production so that household income was equal to aggregate output.

The solutions for private and public sector output and employment are given by:

(17) $Y_P^* = \{A + b[1 - t][T + G_G] + I + G_P\}/\{1 - b[1 - t]\}$

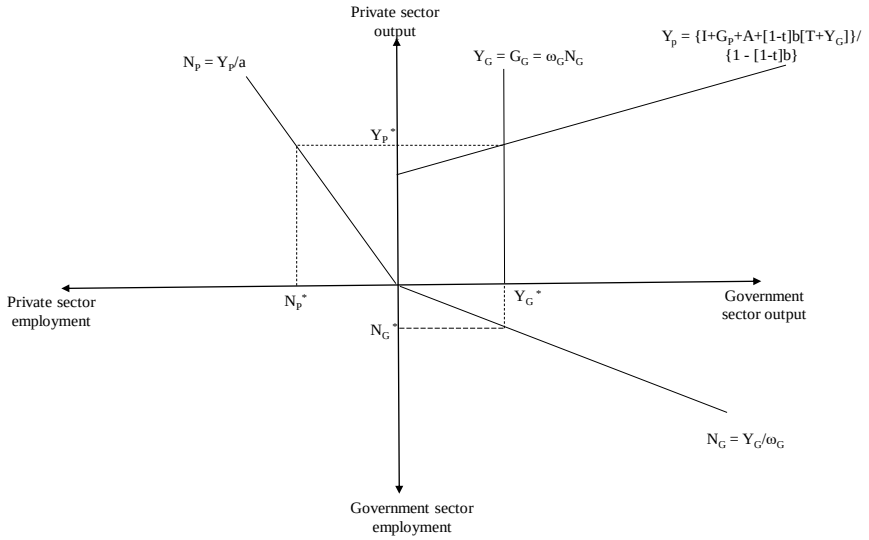
(18) $N_P^* = Y_P^*/a$

(19) $Y_G^* = G_G$

(20) $N_G^* = G_G/\omega_G$

Figure 2 illustrates the amended model and provides a two sector representation of the model. This type of model has been used in open economy macroeconomics to explain the determination of output when there are demand spillovers between countries (see Dornbusch, 1980, Ch. 3), and it has also been used to explain output determination in a multi-sector economy with inter-sector demand spillovers (see Palley 1990).

Figures 2. The determination of public and private sector output and employment in the two sector model.



The northwest quadrant shows the private sector production function which

relates private sector output to private sector employment. The southeast quadrant shows the government sector production function in which the output-labor ratio is the real wage. The northeast quadrant shows the Keynesian general equilibrium determination of output in the two sectors. The positively sloped line represents the private sector's output response function, which is a positive function of government sector output. Its slope is equal to the multiplier associated with spending on government produced output. The vertical line represents the government sector's output response function. It is vertical owing to the exogenous nature of government sector output determination.

The level of public sector output (Y_G^*) and private sector output (Y_P^*) is determined by the intersection of the two output response functions. Public sector output (Y_G^*) is equal to spending on public sector production ($\omega_G N_G$). Private sector output (Y_P) is equal to the demand for private sector output (D). Spending on public sector production stimulates private sector demand since it generates wage income that worker households then spend on private sector produced goods. Aggregate output (Y^*) is equal to the sum of private and public sector output. Note that the sector levels of output can be summed since the numeraire is the private sector price level and it determines the government sector real wage, which is the effective price of government sector output.

Now suppose government procurement is allocated across public production and private sector procurement as follows

(21) $G_P = \alpha G$ $\qquad 0 \leq \alpha \leq 1$

(22) $G_G = [1 - \alpha]G$

α = share of government spending devoted to private procurement. In that case, there are four experiments to consider with regard to government outlays: an increase in transfer

payments (T); an increase in government procurement from the private sector (G_P) holding public production constant; an increase in public sector production (G_G) holding government private sector procurement constant; and a reallocation of government spending (α) from public production to private sector procurement. The first three experiments involve an increase in total government outlays (T + G), while the fourth holds outlays constant.

The appendix shows the total output and total employment multipliers for the IE model that includes a distinction between private and public production. The multipliers can be ranked as follows:

$e_{y,GP} = e_{y,GG} > e_{y,T} > e_{y,\alpha} = 0$

$e_{N,GG} > e_{N,GP} > e_{N,T} > 0 > e_{N,\alpha}$

The output multipliers for government purchases of private sector produced goods ($e_{y,GP}$) and transfer payments ($e_{y,T}$) are exactly as in the standard IE model, with the former being larger. The output multipliers from increased government procurement of private sector production ($e_{y,GP}$) and increased public sector production ($e_{y,GG}$) are the same size. In the canonical Keynesian IE model reallocation of government spending between public and private production ($e_{y,\alpha}$) has no impact on GDP. The reason is they both initially increase aggregate demand by the same amount.

The ranking of employment multipliers is more complex. The employment multiplier from increased government purchases of private sector output ($e_{N,GP}$) and increased transfer payments ($e_{N,T}$) and are the same as in the standard IE model. However, the employment impact from spending on government production is different and larger. The reason the government production employment multiplier is larger is that

there is no profit mark-up (m) on government production so that every dollar spent goes to hire additional workers. In contrast, part of each dollar spent on private sector production is drained off as profit rather than creating employment. That explains why public works spending has a larger employment impact than spending on purchases of military equipment which carry a high profit mark-up.[6]

That employment creation advantage of public production diminishes and eventually reverses as the ratio of the government nominal wage to the private sector wage increases (w_G/w). That is because a higher government sector wage means each dollar spent on government production generates less government employment. If government pays a real wage premium that exceeds the mark-up, the public production employment multiplier becomes smaller than the private goods procurement multiplier.[7]

Lastly, the private sector mark-up helps explain why corporations are so keen to privatize the provision of government services. Privatization of government production turns government production into a corporate profit center by enabling a profit margin on production that was previously undertaken by government without such a margin (Palley, 2020).

5. The Keynesian IE model with a job guarantee program: a three sector interpretation

This section extends the model to incorporate a government job guarantee program (JGP), which has become an idea of considerable interest following the slow imperfect employment recovery after the Great Recession (see Paul et al., 2018: Wray et

[6] The first dollar of spending in the private sector creates 1/a jobs. The first dollar of spending in the government sector creates $1/\omega_G$ jobs. Substituting for the government real wage yields $[1 + m]w/aw_G$. Using the assumption that $w_G = w$, this implies $[1 + m]/a > 1/a$.

[7] The condition for reversal is $[1 + m]w/aw_G < 1/a$, which implies the condition $w_G/w > 1 + m$.

al., 2018). The JGP proposal aims to ensure full employment by making a job available to anyone who wants one. It does so by creating a lower class of government job with a nominal wage (w_J) that is less than the standard government job nominal wage (w_G) so that $w_G > w_J$. Adding a JGP implicitly transforms the model economy into a three sector model made up of private sector production, government sector production, and JGP production.

A job guarantee program can be readily incorporated into the augmented IE model by adding a fixed labor supply (L). The allocation of employment is given by

(23) $L = N_P + N_G + N_J$

N_J = employment in job guarantee programs.

The specification of household consumption is also changed to

(24) $C = A + b[1 - t][Y_P + \omega_G N_G + \omega_J N_J + T]$

ω_J = job guarantee real wage. Household consumption is now augmented by wage income under the job guarantee program.

The model can then be reduced to a three equation system given by

(25) $N_G = G_G/\omega_G$

(26) $N_P = Y_P/a = \{A + b[1 - t][T + G_G + \omega_J N_J] + I + G_P\}/\{1 - b[1 - t]\}a$

(27) $N_J = L - N_P - N_G$

Equation (25) has regular government sector employment (N_G) determined by government spending on public production (G_G) and the regular government job real wage (ω_G). Equation (26) determines the level of private sector employment, which depends on the level of private sector output which equals AD. The level of AD is positively impacted by government spending on private sector goods (G_P), spending on

public sector production (G_G), and spending on guaranteed employment jobs ($\omega_J N_J$). The former directly impacts AD. The latter two indirectly impact AD via their impact on household income and consumption. Equation (27) determines the level of guaranteed employment which is a residual and equal to the labor supply less private sector and government sector employment. Since JGP employment is a residual, it is negatively related to the state of AD which determines private sector employment. The level of AD is a positive function of both government spending and the job guarantee wage (ω_J).

The solution of the model is illustrated in Figure 3. The negatively sloped line determines JGP employment as a function of private sector employment. Increases in private sector employment draw workers out of JGP employment.[8] The positively sloped line has private sector employment being a positive function of JGP employment. That is because JGP jobs pay a wage, and households then spend that wage income on private sector produced goods which increases AD and private sector employment. The levels of private sector employment and JGP employment are determined by the intersection of the two functions.

The slopes of the two lines are:

$dN_J/dN_P|_{NJ} = -1 < 0$

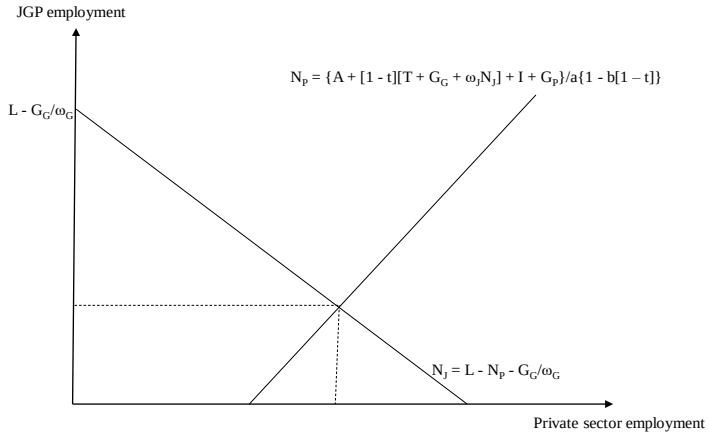
$dN_J/dN_P|_{NP} = a\{1 - b[1 - t]\}/b[1 - t]\omega_J > 0$

An increase in labor productivity (a) steepens the slope of the private sector employment function so that additional JGP jobs create fewer private sector jobs. The reason is the additional AD created by JGP jobs translates into lower private sector job creation owing

[8] At the microeconomic level, assuming workers are indifferent across types of job, a necessary condition for this is $w > w_J$. Private sector jobs pay must pay more than JGP jobs so that workers are willing to take up private sector jobs when openings emerge.

to the increased productivity of private sector workers. An increase in the JGP wage (ω_J) flattens the slope of the private sector job function. The reason is the higher JGP wage means guaranteed jobs have a larger impact on AD and private sector labor demand. The same holds for increases in the propensity to consume (b). Lastly, a higher tax rate (t) steepens the slope of the private sector job function by reducing the AD impact of guaranteed jobs.

Figure 3. The determination of private sector and job guarantee employment.



The comparative statics are shown in Table 1 and can be understood with the assistance of Figure 3. Expansionary fiscal policy shifts the private sector employment function right, and may also change its slope for reasons discussed above. The result is to increase private sector employment and reduce JGP employment. The logic is it increases AD, creating more private sector jobs. Those jobs are then filled by drawing workers out of the JGP sector employment so that the new equilibrium has increased private sector employment and lower JGP employment.

An increase in labor supply shifts the JGP employment function up. An increase in public sector employment shifts it down, and also shifts the private sector employment function right. In both cases, the absolute level of private sector employment increases owing to the induced AD stimulus provided.

An important feature of Table 1 is that total employment is constant since the economy is always at full employment. In effect, all who would otherwise be unemployed now have guaranteed employment jobs. Expansionary fiscal policy or other expansionary AD developments therefore change the composition of employment, shifting workers out of guaranteed employment jobs into private and public sector employment.

Table 1. Employment comparative statics of the model with guaranteed employment.

	$dw_G > 0$ ($dG_G > 0$)	$dw_G > 0$ ($dG_G = 0$)	$dG_G > 0$ ($dw_G = 0$)	$dw_J > 0$	$dG_P > 0$	$dT > 0$	$dt > 0$	dA	db	da
dN_G	0	-	+	0	0	0	0	0	0	0
dN_J	-	?	-	-	-	-	+	-	-	+
dN_P	+	+	+	+	+	+	-	+	+	-
$dN_G+dN_J+dN_P$	0	0	0	0	0	0	0	0	0	0

The model can also be represented in private sector output (Y_P) – job guarantee output (Y_J) space, and a similar exercise can be conducted for output. There are now three types of output in the economy: output produced in the private sector, output

produced in the regular government sector, and output produced in the job guarantee sector.

(28) $Y = Y_P + Y_G + Y_J$

(29) $Y_G = G_G/p = \omega_G N_G$

(30) $Y_J = \omega_J N_J$

Job guarantee output is accounted for in the national income accounts in exactly the same way as public sector output, and is equal to the wage bill (i.e. the cost of inputs). In contrast, unemployment benefit payments are accounted for as a transfer payment to households and do not add to national income. The justification for that difference in treatment is job guarantee payments are claimed to generate services for society equal to the value of the payments.

Table 2 shows the comparative statics for output effects. Even though total employment is unchanged, output can increase. That happens when employment is shifted from the low wage guaranteed employment sector to the higher wage public and private sectors.

The one exception to this is a positive productivity shock ($da > 0$) for which the employment shifts are in a different direction yet output still increases. Initially, the productivity shock lowers private sector employment while leaving private sector output unchanged because AD is unchanged. With unchanged AD, higher worker productivity requires fewer workers to meet demand. Laid off private sector workers then move into guaranteed employment jobs, which provides a fiscal stimulus to AD via their wages. That increases output in the private sector and also recovers some of the private sector jobs that were initially lost.

Table 2. Output comparative statics of the model with guaranteed employment.

	$dw_G > 0$ ($dG_G > 0$)	$dw_G > 0$ ($dG_G = 0$)	$dG_G > 0$ ($dw_G = 0$)	$dw_J > 0$	$dG_P > 0$	$dT > 0$	$dt > 0$	dA	db	da
dY_G	+	0	+	0	0	0	0	0	0	0
dY_J	-	+	-	+	-	-	+	-	-	+
dY_P	+	+	+	+	+	+	-	+	+	+
$dY_G+dY_J+dY_P$	+	+	+	+	+	+	-	+	+	+

Lastly, an important feature of a JGP is it acts as an automatic stabilizer. When private sector AD contracts, private sector workers are laid off and they move into the JGP sector. They then spend their wages on private sector goods, thereby helping stimulate the private sector and diminishing the impact of the negative demand shock. The reverse happens with positive private sector AD shocks, with workers moving out of guaranteed employment to higher wage jobs in the private sector. That movement into JGP jobs helps automatically diminish the impact of negative demand shocks, while the movement out of JGP jobs helps automatically diminish the impact of positive demand shocks.

6. The Kaleckian IE model

The Keynesian IE model makes no mention of the AD effects of income distribution. However, income distribution effects are important for the macroeconomic impact of

both public sector production and JGP employment for two reasons. First, both types of spending have higher initial employment impacts than spending on private output because none of the spending is immediately drained off in the form of a price mark-up. Second, both types of spending generate income for worker households which have a higher propensity to consume, and that impacts their multipliers. Those features point to the importance of analyzing government spending in the Kaleckian IE model which does recognize the AD impact of income distribution.

The Kaleckian IE model requires specifying the functional distribution of income and re-specifying consumption behavior. A simple version is given by:

(31) $s_\pi = m/[1 + m]$ $\quad 0 \leq s_\pi < 1$

(32) $s_w = 1/[1 + m]$ $\quad 0 < s_W \leq 1$

(33) $s_\pi + s_w = 1$

(34) $C = C_K + C_W$

(35) $C_K = b_K[1 - t][s_\pi Y]$ $\quad 0 < b_K \leq 1$

(36) $C_W = [1 - t][s_w Y + T]$

w = nominal wage, s_π = profit share, s_w = wage share, C_K = capitalist household consumption, C_W = worker household consumption.

Equations (31) and (32) determine the profit and wage share respectively, while equation (33) is the national income adding-up constraint.[9] The mark-up determines income shares. Equation (34) defines aggregate consumption, which consists of consumption of capitalist and worker households. Equation (35) determines capitalist

[9] The expressions for the profit and wage share are obtained from the expressions for profits and the wage bill. Profits are given by $\Pi = Y - wN/p$. The wage bill is given by $W = wN/p$. Combining these expressions with the expressions for the production function and the price level, enables solution for the profit and wage share expressions.

household consumption, with b_K being capitalist households' propensity to consume. Capitalist households are assumed to receive all profit income and no wage income. Equation (36) determines worker household consumption, and worker households are assumed to have a propensity to consume of unity (i.e. save nothing). Worker households are assumed to receive all wage income and no profit income, and they are also assumed to receive all government transfer payments.

Replacing equation (3) in the standard Keynesian IE model with equations (34) – (36) and solving, yields solutions for output and employment given by:

(37) $Y^* = \{[1 - t]T + I + G\}/\{1 - b_K[1 - t]s_\pi - [1 - t]s_w\}$

(38) $N^* = Y^*/a$

The appendix shows the government spending output and employment multipliers.

The critical feature of the Kaleckian model is its introduction of income distribution into the analysis. Income distribution matters for AD because worker and capitalist households have different propensities to consume.[10] Increases in the wage share increase AD, output, and employment because worker households have higher propensity to consume than capitalist households. The reverse holds for increases in the profit share. Whereas the mark-up has no AD effect in the standard Keynesian IE model, it is a critical variable in the Kaleckian model as it determines the profit and wage shares which determine how income is channeled to different household types.

7. The Kaleckian IE model with government production

Government production can be added to the standard Kaleckian IE model by using the

[10] In the current model income distribution is restricted to impact consumption spending. In fuller models it also impacts investment spending. Those effects are excluded in the current analysis because they add nothing regarding the issue being examined.

equations of the Keynesian IE model with government production (equations (5) – (6) and (9) – (15)) and re-specifying aggregate consumption as follows:

(39) $C = C_K + C_W$

(40) $C_K = b_K[1 - t][s_\pi Y]$ $\quad 0 < b_K < 1$

(41) $C_W = [1 - t][s_w Y + \omega_G N_G + T]$

The capitalist household consumption function is unchanged by the introduction of government production. However, worker households now receive the public sector wage bill. The solutions for output and employment are given by:

(42) $Y_P^* = \{[1 - t][T + G_G] + I' + G_P\}/\{1 - b_K[1 - t]s_\pi - [1 - t]s_w\}$

(43) $N_P^* = Y^*/a$

(44) $Y_G^* = G_G$

(45) $N_G^* = G_G/\omega_G$

(46) $G_P = \alpha G'$

(47) $G_G = [1 - \alpha]G'$

The graphical solution of the model is identical to that shown in Figure 2. However, the slope of the private sector output function is now impacted by the distribution of income, with the slope being a negative function of the wage share. Analytically, the expenditure multiplier is a positive function of the wage share. A higher wage share, means a higher proportion of income goes to worker households which have a higher propensity to consume. Consequently, increases in government output generate a larger induced increase in AD, which generates a larger induced increase in private sector output.

As before, there are four fiscal policy experiments: an increase in transfer (T), an

increase in private sector procurement (G_P) holding public production constant, in increase in public sector production (G_G) holding private sector procurement constant, and a reallocation of government spending from public production to private sector procurement (α). The first three experiments involve an increase in total government outlays (T + G), while the fourth holds outlays constant.

The total output and total employment multipliers are shown in the appendix. The multipliers can be ranked as follows:

$e_{y,GG} > e_{y,GP} > e_{y,T} > 0 > e_{y,\alpha}$

$e_{N,GG} > e_{N,GP} > e_{N,T} > 0 > e_{N,\alpha}$

The signings of the multipliers is the same as in the Keynesian IE model with production, but their relative size changes in the Kaleckian model. In the Keynesian IE model increases in government procurement (G_P) and government production (G_G) have the same output multiplier ($e_{y,GP} = e_{y,GG}$), whereas in the Kaleckian model the procurement multiplier is smaller than the production multiplier ($e_{y,GP} < e_{y,GG}$). The reason is the introduction of income distribution effects in AD. Now, the second round induced consumption spending effect on AD is larger for government production than for government procurement. That is because increases in government production generate pure wage income, all of which goes to worker households which have a higher propensity to consume. In contrast, part of procurement spending goes to capitalist households in the form of profit share, and they have a lower propensity to consume. Consequently, procurement spending generates less induced consumption spending, resulting in less induced income generation.

The difference in the size of the multipliers depends positively on the size of the

mark-up and positively on the absolute difference in the propensities to consume of capitalist and worker households. In the Kaleckian model there is a greater output expansion benefit from spending on public production (e.g. municipal services) than from purchases of private sector output (e.g. military hardware) which are subject to a profit mark-up. The mark-up reduces AD because profit income accrues to capitalist households which have a lower propensity to consume.

That logic explains why the output multiplier from a redistribution of government spending toward private sector procurement is negative ($e_{y,\alpha} < 0$). The Kaleckian model with government sector production therefore generates a new balanced budget multiplier. Redistributing government spending toward government sector production increases output. Total government spending is unchanged, but output increases due to the changed composition of government spending.

Turning to employment, compared to the Keynesian IE model, the Kaleckian employment multiplier from increased spending on government production is now even larger than that from increased spending on government procurement. That is because of the additional positive employment effects from greater induced private sector output expansion. As before the size of the difference in the employment multipliers depends on the mark-up (m) , the relative private and government sector wage (w/w_G), and private sector labor productivity (a). A higher mark-up, a higher private sector wage, and higher private sector labor productivity all reduce the government procurement employment multiplier relative to the government production employment multiplier.

Lastly, in principle, the Kaleckian model could be further refined by dividing government spending on private sector goods into purchases of consumption goods and

investment goods. Government purchases of investment goods introduces the issue of public capital, which affects the supply-side of the economy. The standard way of modelling that supply-side effect is via an aggregate production function that includes capital as an argument. In the current context, public capital can be viewed as increasing private sector labor productivity (a), which lowers prices and increases real wages.

In the Kaleckian model the composition of government procurement from the private sector may matter for AD owing to distribution effects. If consumption and investment goods are produced via the same production process and have the same mark-up, the sector employment and output multipliers are the same. If they are produced differently and have different mark-ups, the multipliers must be examined in a two sector model. The individual sector employment and output multipliers will depend positively on the sector's labor intensiveness and negatively on the sector's mark-up and profit share.

8. The Kaleckian IE model with a job guarantee program

Lastly, the Kaleckian IE model can also be expanded to incorporate a JGP sector. As in the Keynesian IE model, that requires adding a labor supply constraint (see equation (23)) which determines the allocation of employment across the private sector, government production, and guaranteed employment jobs. Additionally, the specification of worker household consumption becomes

(48) $C_W = [1 - t][s_w Y + \omega_G N_G + \omega_J N_J + T]$

Worker household consumption is therefore augmented by wage income under the job guarantee program ($\omega_J N_J$).

The Kaleckian IE model can then be reduced to a three equation system given by

(49) $N_G = G_G/\omega_G$

(50) $N_J = L - N_P - N_G$

(51) $N_P = Y_P/a = \{[1 - t][T + G_G + \omega_J N_J] + I + G_P\}/\{1 - b_K[1 - t]s_\pi - [1 - t]s_w\}$

Graphically, the solution of the Kaleckian model is the same as in Figure 3. Analytically, the only difference is that the slope of the private sector employment function is affected by the distribution of income and the propensities to consume of capitalist and worker households. The greater the wage share, the flatter the slope so that private sector employment and output are larger for a given level of JGP employment.

9. Conclusion

This paper has examined the implications of introducing a distinction between government procurement and government production in the Keynesian IE model. It also analyzed the impact of introducing JGP employment. Those features change the IE model from a single sector model to a multi-sector model. Adding government production makes it a two sector model. Further adding a JGP makes it a three sector model. The JGP was shown to have significant automatic stabilizer properties, which is an important macroeconomic policy contribution.[11]

Thereafter, the paper extended the analysis to the Kaleckian version of the IE model in which the functional distribution of income impacts AD. The Kaleckian version yields several insights. First, government spending on government sector production has a larger output and employment multiplier than government spending on private sector produced goods and services. The model therefore helps explain the reason for real world

[11] The paper focused exclusively on the macroeconomic automatic stabilizer properties of the JGP. There is an additional voluminous literature on the JGP re its microeconomic logic and impacts, its political economy implications, and its financing implications. The paper does not address any of those issues.

differences in the size of fiscal policy expenditure multipliers. Second, it shows how privatization turns production of government services into a private profit center, which increases the profit share and reduces output and employment for a given level of spending. Third, it introduces a new balanced budget multiplier that arises from changing the composition of government spending on purchases of privately produced goods versus government produced services.

Appendix

A.1 Standard Keynesian IE model:

The government spending output and employment multipliers are

$e_{y,G} = 1/\{1 – b[1 - t]\}$

$e_{N,G} = 1/a\{1 – b[1 - t]\}$

The transfer spending output and employment multipliers are

$e_{y,T} = b[1 - t]/\{1 – b[1 - t]\} > 0$

$e_{N,T} = b[1 - t]/a\{1 – b[1 - t]\} > 0$

A.2 Keynesian IE model with a distinction between private and public production:

The output and total employment multipliers are:

$e_{y,T} = b[1 - t]/\{1 - b[1 – t]\} > 0$

$e_{y,GP} = 1/\{1 - b[1 – t]\} > 0$

$e_{y,GG} = 1/\{1 - b[1 – t]\} > 0$

$e_{y,\alpha} = 0$

$e_{N,T} = b[1 - t]/a\{1 - b[1 – t]\} > 0$

$e_{N,GP} = 1/a\{1 - b[1 – t]\} > 0$

$e_{N,GG} = 1/\omega_G + b[1 - t]/a\{1 - b[1 – t]\} > 0$

$e_{N,\alpha} = 1/a - 1/\omega_G < 0$

A.3 Standard Kaleckian IE:

The government spending output and employment multipliers are:

$e_{y,G} = 1/\{1 - b_K[1 – t]s_\pi - [1 – t]s_w\} > 0$

$e_{N,G} = 1/a\{1 - b_K[1 – t]s_\pi - [1 – t]s_w\} > 0$

The transfer spending output and employment multipliers are:

$e_{y,T} = [1 - t]/\{1 - b_K[1 - t]s_\pi - [1 - t]s_w\} > 0$

$e_{N,T} = [1 - t]/a\{1 - b_K[1 - t]s_\pi - [1 - t]s_w\} > 0$

A.4 Kaleckian IE model with a distinction between private and public production:

The total output and total employment multipliers are:

$e_{y,T} = [1 - t]/\{1 - b_K[1 - t]s_\pi - [1 - t]s_w\} > 0$

$e_{y,GP} = 1/\{1 - b_K[1 - t]s_\pi - [1 - t]s_w\} > 0$

$e_{y,GG} = 1 + [1 - t]/\{1 - b_K[1 - t]s_\pi - [1 - t]s_w\} > 0$

$e_{y,\alpha} = \{-1 + t/[1 - b_K[1 - t]s_\pi - [1 - t]s_w]\}G' < 0$

$e_{N,T} = [1 - t]/a\{1 - b_K[1 - t]s_\pi - [1 - t]s_w\} > 0$

$e_{N,GP} = 1/a\{1 - b_K[1 - t]s_\pi - [1 - t]s_w\} > 0$

$e_{N,GG} = 1/\omega_G + [1 - t]/a\{1 - b_K[1 - t]s_\pi - [1 - t]s_w\} > 0$

$e_{N,\alpha} = -1/\omega_G + t/a\{1 - b_K[1 - t]s_\pi - [1 - t]s_w\} < 0$

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