The Job Guarantee

Toward True Full Employment

Edited by
Michael J. Murray
and Mathew Forstater

2013

palgrave
macmillan

Fair, Ray. 1994. *Testing of Macroeconometric Models*. Cambridge: Harvard University Press.

———. 2004. *Estimating How the Macroeconomy Works*. Cambridge, MA: Harvard University Press.

———. 2007. "Evaluating Inflation Targeting Using a Macroeconometric Model." *Economics—The Open Access, Open Assessment E-journal*, June. http://fairmodel.econ.yale.edu/rayfair/pdf/2006A.PDF

Fullwiler, Scott T. 2007. "Macroeconomic Stabilization through an Employer of Last Resort." *Journal of Economic Issues* 41(1) March: 93–134.

Fullwiler, Scott T. and L. Randall Wray. 2010. "Quantitative Easing and Proposals for Reform of Monetary Policy Operations." Working Paper No. 645 Jerome Levy Economics Institute (December).

Kelton, Stephanie and Avraham Baranes. 2012. "Adding the Domestic Private Sector Balance." Unpublished presentation. http://www.slideshare.net/MitchGreen/adding-the-domestic-private-sector-financial-balance

Lerner, Abba. 1943. "Functional Finance and the Federal Debt." *Social Research* 10 (February): 38–51.

Minsky, Hyman P. 1986. *Stabilizing an Unstable Economy*. New Haven, CT: Yale University Press.

Mitchell, William, and Joan Muysken. 2008. *Full Employment Abandoned: Shifting Sands and Policy Failures*. Northampton, MA: Edward Elgar.

Mosler, Warren B. 1997–1998. "Full Employment and Price Stability." *Journal of Post Keynesian Economics* 20(4) (Winter): 167–182.

Nell, Edward J. and Mathew Forstater (eds). 2003. *Reinventing Functional Finance: Transformational Growth and Full Employment*. Northampton: Edward Elgar.

Tcherneva, Pavlina. 2012. "Full Employment through Social Entrepreneurship." Policy Note 2012/2. Jerome Levy Economics Institute (March).

Tcherneva, Pavlina and L. Randall Wray. 2005. "Is Argentina's *Jefes de Hogar* Program an Employer of Last Resort?" Working Paper No. 43. Center for Full Employment and Price Stability (August).

Wray, L. Randall. 1998. *Understanding Modern Money—The Key to Full Employment and Price Stability*. Northampton: Edward Elgar.

CHAPTER 5

EFFECTIVE DEMAND, TECHNOLOGICAL CHANGE, AND THE JOB GUARANTEE PROGRAM

MICHAEL J. MURRAY

THE GOAL OF THIS CHAPTER IS TO STUDY THE CONDITIONS REQUIRED FOR the maintenance of full employment within a growing economy comprised of ongoing structural change. Two conditions are considered: an effective demand condition and a structural change condition (Pasinetti 1981). The effective demand condition is mostly associated with the work of John Maynard Keynes and has become a central focus in post-Keynesian economic analysis. As in Keynes (1964), post-Keynesians have rejected the notion that self-regulating markets bring about conditions to attain full employment, whereby full employment becomes only a special case scenario and unlikely to occur in a laissez faire economy. "Pump priming" stimulus may not be sufficient to bring the economy to full employment as different public policies have different effects on private sector employment. Rather, post-Keynesians have favored a targeted demand approach (Tcherneva 2011). Absent of direct federal job creation, fiscal policy must target job creating sectors, which will be much more effective than traditional aggregate demand stimulus.

The employment effects of technological and structural change have for the most part become a separate line of research for heterodox economists.[1] The negative effects of technological progress on the working class are seen as early as the third edition of Ricardo's *Principles* by the inclusion of his chapter "On Machinery." Ricardo retracted his earlier position that the application of labor-saving machinery was beneficial to both capitalists and laborers. In the third edition, Ricardo opened up the possibility of the adverse effects of technological advancement:

> There is one other case that should be noticed of the possibility of an increase in the amount of the net revenue of a country, and even of its gross revenue, with a diminution of demand for labour, and that is, when the labour of horses is substituted for that of man. If I employed one hundred men on my farm, and if I found that the food bestowed on fifty of those men, could be diverted to the support of horses, and afford me a greater return of raw produce, after allowing for the interest of the capital which the purchase of the horses would absorb, it would be advantageous to me to substitute the horses for the men, and I should accordingly do so; but this would not be for the interest of the men, and unless the income I obtained, was so much increased as to enable me to employ the men as well as the horses, it is evident that the population would become redundant, and the labourers' condition would sink in the general scale. (Ricardo 1817)

The second inclusion of note is Karl Marx's analysis of the "laws of motion" of capitalist development, which centers on capital accumulation. Fierce competition drives capitalists towards labor-saving innovations. Existing laborers become the "lever" of capitalist accumulation, producing new, innovative capital goods to be used in forthcoming production (Lowe 1976). By doing so, the class of laborers becomes obsolete; essentially, they are working themselves out of a job, creating a "mass of human material" (technological unemployment) that is always ready for exploitation.

Ricardo and Marx's analysis set the foundation for the structural and technological unemployment debates to follow, known as the "compensation controversies" (Hagemann 1995). On one side, there were followers of Ricardo and Marx who were *pro-displacement* and on the other were political economists who were *pro-compensation*. The pro-compensation camp argued that wage reduction caused by reduced demand would reabsorb those who became technologically unemployed. This list included economists such as John Stuart Mill, Knut Wicksell and later Joseph Schumpeter.

The pro-displacement camp included Hans Neisser (1942) who concluded that technological progress results in permanent technological unemployment. Neisser's conclusion resulted from the realization that the demand for commodities is not the demand for labor. Technological advancement requires the utilization of less labor per unit of output, thus even when labor productivity couples with the growth in the demand for

commodities, by definition less labor would be required for its production than was initially expelled. Expansion of output involves a continuous race between capital accumulation and the demand for workers; capital accumulation always wins out leaving a portion of the labor supply permanently redundant.

John R. Hicks also favored Ricardo's assertion, and concluded (at least for the short run) that technological innovation would be detrimental to the class of workers. Hicks (1973) later refined his analysis extending his contribution in his last book *Capital and Time*. Here Hicks developed the theory of "traverse analysis" or the study of the employment effects of technological progress in historical time. Adolph Lowe (1976) resumed Hick's traverse analysis in *The Path of Economic Growth*, in which, among other objectives, Lowe set out to delineate the compensation requirements for workers expelled by technological progress. An intriguing conclusion arising from Lowe's (1965; 1976) analysis is that full compensation of expelled workers in the shortest possible time requires some form of government intervention in the workings of the economy.

Structural and technological unemployment is a consequence of growing, competitive economies, as evidenced by recent US experience. The 1990s experienced the expansion of the Information-Communication-Technologies (ICT) sector, which created a surge in labor productivity throughout the decade. However, the 1990s also witnessed wage stagnation and growing inequality and deterioration of the standards of living of people in the United States and abroad (Pollin 2003) and followed by unemployment and recession in the 2000s. In the present day, global economies are suffering the effects of the financial crisis. The crisis not only brought US unemployment rates to post–World War highs, but the duration of unemployment is at a historic high. Deficient demand is certainly one reason for the stagnation. However, the current period is also experiencing structural unemployment—which is harder to address with Keynesian stimulus policies.

The financial crisis has had unequal effects. Minorities, youth, and low-skilled individuals have been disproportionately affected. Some productive sectors have been harder hit than others; these include manufacturing, construction, and parts of the financial industry (Estevão and Tsounta 2011). More striking is that for some of the unemployed, their job is not coming back. Over half of the layoffs during the Great Recession have been permanent layoffs (7).

The Great Recession has created a skills mismatch in the United States—there has been a wedge created between the available pool of skills and the demand for labor. The unemployment rate for low-skilled workers (in terms of years of schooling) has increased disproportionately during the current crisis, while demand for high-skilled labor (which comprises a third of the US civilian labor force) is already on the rise (8–10). Moreover, moving forward, this mismatch might intensify further as manufacturing dwindles as a share of total output while the ICT sector and the "knowledge economy" become critical components to US production (Gualerzi and Nell 2010).

The agenda for government needs retooling given continuous structural change in the US economy. It is a myth that governing officials can stand idly aside and let markets resolves these issues. Markets are ill-equipped to deal with unemployment given the complexities of modern-day production. The maintenance of full employment must be an active policy pursued by federal governments. A federal direct job creation strategy such as the Employer of Last Resort (ELR) program has the potential to provide the economy with "flexible full employment" in the face of structural rigidities (Forstater 1998) and structural change (Forstater 2002) that is illustrative of modern day economies. By maintaining full employment, the ELR program accounts for the effective demand condition by stabilizing consumption demand and accounts for the structural and technological change condition by creating employment programs and offers retraining and education to those whose skills become obsolete.

The ELR program as a job creation strategy maintains full employment while benefiting consumers with higher aggregate wages and consumption levels, and benefiting private sector businesses with higher aggregate profits and investment. The stimulus generated by ELR employment leads to higher levels of Gross Domestic Product (GDP) as compared to a non-ELR economy. The current chapter studies these outcomes.

To make the argument of the effectiveness of the ELR program for private businesses and consumers, a simplified economy with three market participants "capitalists," "workers," and "government" operating in a closed economy is considered. Then simulations are conducted to decipher the dual consequences of consumer demand growth generated by a growth in the labor force coupled with labor productivity in a free-market economy (base-model); and comparing these results with identical simulations for an economy in which the government operates an ELR program (ELR-model). Comparisons between the base-model simulations and the ELR-model simulations allow conclusions to be drawn of the ELR programs effectiveness over laissez-faire policies. To begin, some initial assumptions regarding the behavior of our market participants are in order.

The Initial Conditions of the Economic Model

Let N represent the aggregate population and let w represent wages and W the wage bill; thus aggregate consumption (C) becomes equal to the whole of workers' wages plus an autonomous component (a) to satisfy basic needs. Let aggregate investment (I) equal capitalists' profits (π). Governments spend on roads, bridges, hospitals, military, and a variety of additional public services so as a first pass assume government spending is autonomous. We get the following identities:

$$Y = C + I + G \quad \text{(aggregate income)}$$
$$W = wN \quad \text{(wage income)}$$
$$C = a + W \quad \text{(aggregate consumption)}$$
$$I = \Pi \quad \text{(aggregate investment = aggregate profits)}$$
$$G = G \quad \text{(autonomous government spending)}$$

We will consider a five-sector capitalist economy with fixed production coefficients under constant returns to scale[2] operating initially at full employment. The statement of full employment is *not* an assumption that the model economy tends to full employment. By taking the extreme case that the model economy is initially at full employment, if it is demonstrated that the model economy cannot maintain this level of production over time, then by no means can "normal economies" attain full employment for any significant period without direct government involvement (Forstater 2002; Pasinetti 1993; 2007).

Table 5.1 displays the initial economy described in an input-output model. The columns of final demand are disaggregated into their consumption and investment components as this separation highlights the effects that labor-displacing technological process has on the distribution of the social surplus between capitalists' profits and workers' wages.

Traditional notation (a_{ij}, l_i) is used to represent the coefficient matrix calculated from table 5.1 where:

$$a_{ij} = \frac{A_{ij}}{Q_i} \quad \text{(capital inputs per unit of output)} \qquad (1)$$

$$l_i = \frac{L_i}{Q_i} \quad \text{(labor requirement per unit of output)} \qquad (2)$$

$$\pi = \frac{\Pi}{Q_i} \quad \text{(profits per unit of output)} \qquad (3)$$

where a_{ij} represents the amount of commodity i used by industry j; l_i represents the labor requirement per units of output in sector i; π represents

Table 5.1 Hypothetical base-model input output table; initial period

Industry/ Commodity	A	B	C	D	E	Intermediate Output	Consumption	Investment	GDP	Total Output
A	100	20	50	350	200	720	250	200	450	1170
B	80	40	20	140	150	430	150	150	300	730
C	300	10	60	410	300	1080	270	120	390	1470
D	200	50	60	80	150	540	290	220	510	1050
E	90	35	40	200	120	485	220	170	390	875
Intermediate Purchases	770	155	230	1180	920	3255		–	–	–
Wages	236	236	236	236	236	–	1180	–	–	–
Profits	200	150	120	220	170	–	–	860	–	–
Total VA	436	386	356	456	406				2040	
Total Income	1206	541	586	1636	1326		–	–	–	5295

Table 5.2 Base-model coefficient matrix; initial period

Industry/Commodity	A	B	C	D	E
A	0.085	0.027	0.034	0.333	0.229
B	0.068	0.055	0.0136	0.134	0.171
C	0.256	0.014	0.041	0.286	0.343
D	0.171	0.068	0.041	0.076	0.171
E	0.076	0.048	0.027	0.19	0.137

profits per unit of output in the initial period. Table 5.2 details the coefficient matrix.

With this information, the quantity model for our hypothetical economy equates:

$$AQ + Y = Q \tag{4}$$

Solving for Q:

$$(1-A)^{-1}Y = \begin{bmatrix} 1170 \\ 730 \\ 1470 \\ 1050 \\ 875 \end{bmatrix} \tag{5}$$

In the simulations to follow, allow prices to remain stable over time. This assumption is a matter of convenience but this assumption is also consistent with historical experience (Lee 1998; Blinder 1994; Small and Yates 1999) and is consistent with economic impact analysis utilizing Regional Impact Multipliers of Bureau of Labor Statistics (RIMS II multipliers),[3] and REMI forecasts.[4] The pricing model is given in equations 6 and 7. Wages and profits (expressed in terms of per unit of output, denoted π and w respectively) are paid post factum. The product Ap equates to the material cost of producing one unit of output; added onto this product is the value added component divided between wages per unit of output (w) and the markup per unit of output (π).

$$Ap + (\pi + w) = p \tag{6}$$

Solving for p:

$$(1-A)^{-1}(\pi + w) = \begin{bmatrix} 2.13 \\ 1.67 \\ 2.89 \\ 1.79 \\ 1.63 \end{bmatrix} \tag{7}$$

Table 5.3 Base-model distribution of the social surplus; initial period

Sector	A	B	C	D	E
Wages	0.202	0.323	0.161	0.225	0.27
Profits	0.171	0.205	0.082	0.209	0.194

Table 5.3 displays the initial labor requirements and profits per unit of output for each sector; this table also represents the distribution of the social surplus between wages and profits.

The numeraire is \$1.00. The wage rate will also be given a value of \$1.00. This wage rate creates equality between the wage bill and the physical quantity of hours and remedies the problem that an input-output matrix measures economic activity in monetary dollars rather than in physical units. When $w = \$1.00$ the inter-industry matrix depicts both physical requirements of production and the distribution of the surplus between wages and profits. (For example, table 5.1 depicts wages per sector equal to \$236. Aggregate wages in all sectors (W) = \$1,180 which is equal to aggregate consumption. Aggregate profits are equal to aggregate investment which is equal to \$860. Aggregate employment is equal to 1,180 workers, which under the initial assumption of full employment is equal to the initial size of our population.)

Base-Model Simulations

From this initial setup, base-model simulations are conducted. Two structural dynamics are considered: an exogenous rate of population growth (g) and an exogenous rate of labor productivity (ρ), which serves as a proxy for technological progress.[5] These magnitudes affect the movement of both labor coefficients and consumption coefficients over time.

The first dynamic to be considered is a growing population. From table 5.1 the initial population is 1,180. Let the population grow at constant positive rate g. For matters of convenience, let the total population at time t be equal to the labor force at time t. From the initial conditions the population at any time ($N[t]$) can be expressed as:

$$N(t) = 1180e^{gt} \quad (8)$$

Similarly, the labor force at any time ($L[t]$) is:

$$L(t) = 1180e^{gt} \quad (9)$$

The next dynamic to consider is technological progress. Labor becomes more productive with the passage of time due to labor operating alongside faster and more efficient capital goods, which is consistent with US historical experience.[6] The rate of diffusion of new technology is dependent upon the physical life of capital goods. Worn out capital goods get replaced with new capital goods which are the most efficient and embody the latest inventions. Innovations which speed up production and utilize less labor are more rapidly diffused.

Diffusion becomes continuous. With durable capital equipment, there is a continual game of "leap-frog" being played (Robinson 1965, 86). If ten years is the profitable life of capital equipment, a nine-year-old plant will have the highest costs and yield the lowest profits. When this equipment is replaced the following year, the plant enjoys the lowest costs and highest profits. Every successive year new entrants produce with the latest capital equipment causing plants utilizing older equipment to lose their competitive advantage over time (Robinson 1965, 85–85). The diffusion of capital equipment becomes very rapid as each plant is exposed to pressure of existing competitors and new entrants (Robinson 1965, 87).

To simulate these phenomena, allow the labor requirement per unit of output in sector i at time t to be a continual function of the rate of technical progress as expressed in equation 10.

$$li(t) = li(0)e^{-\rho t} \quad (10)$$

We can now see that population growth and technological progress are opposing forces. Depending upon the relative degree of the population growth rate *vis-a-vis* the rate of technological progress, employment may increase, decrease, or remain unchanged. Technological unemployment becomes a natural occurrence in a laissez-faire economy when the rate of labor productivity exceeds the rate of consumer demand growth, leaving workers unabsorbed into the workforce. Economists call this "jobless growth" and it is characteristic of the stagnation seen in global economies following the financial crisis.

To have jobless growth, then, "no jobs" must be coupled with "economic growth." At the outset, this seems like a paradox. Typically, economic growth means more demand and hence more jobs; but when technological advancement makes labor superfluous both technological and Keynesian unemployment are the natural outcome, even in the face of economic growth.

Nevertheless, for there to be economic growth there must be a source of spending and demand. Consumption is a function of wage income, wage income is lost because of lost work; and workers decrease their consumption expenditures considerably. Thus, the source of economic growth in a jobless recovery is found in the capitalist class. Capitalist's savings from a smaller wage bill due to implementing advanced technologies are held over into profits to further investment spending in even newer technologies.[7] This shift in spending compensates for the reduction in consumption demand.

Jobless growth can be simulated in the model. To do this, assume a rate of technological progress (say 4%) just above that of the growth of the labor force (say 3%)[8] (which is a proxy for the growth rate of consumption demand) and simulate the results through seven periods. This situation is characteristic of the current stagnation during the Great Recession (2007–present) and the results are similar to the US economic situation in the early 2000s when labor productivity grew faster (3%) than output (1%) which resulted in a rise in unemployment (Stiglitz 2003, 182).

The results of the simulation are displayed in figures 5.1 and 5.2. Figure 5.1 illustrates the reductions in labor (wages), per unit of output for each sector over seven periods (indicated graphically by a reduction in the width of the l_i coefficients). Essentially, what this graph is demonstrating is that there is a continual replacement of workers by machines, creating a reduction in average variable cost, an increase in surplus value for capitalists, and exploitation of laborers. Figure 5.2 illustrates the redistribution of income from the working class to the capitalist class depicted by an increase in profit per unit of output for each sector (indicated graphically by an increase in the respective width of the ρ_i coefficients).

An ever-increasing portion of the total output shifts from worker consumption to capitalist earnings. This dynamic constitutes a shift in the composition of the social surplus away from wage earners to capitalists. Nevertheless, the whole of the social product is always purchased, but this

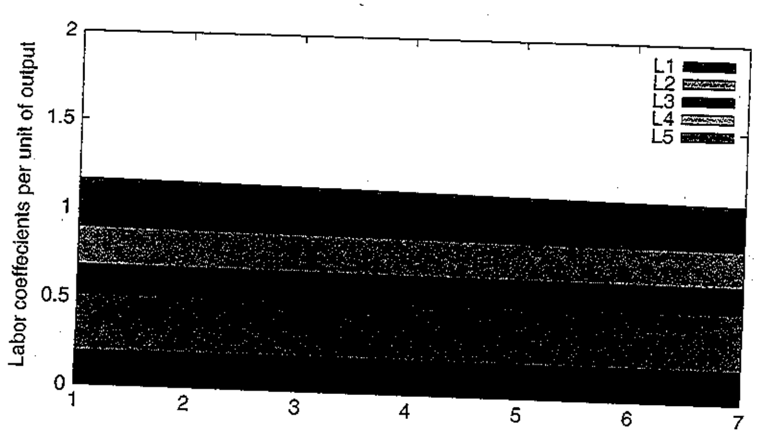

Figure 5.1 Reduction in labor coefficients over seven simulated periods.
Source: Author's *calculations*.

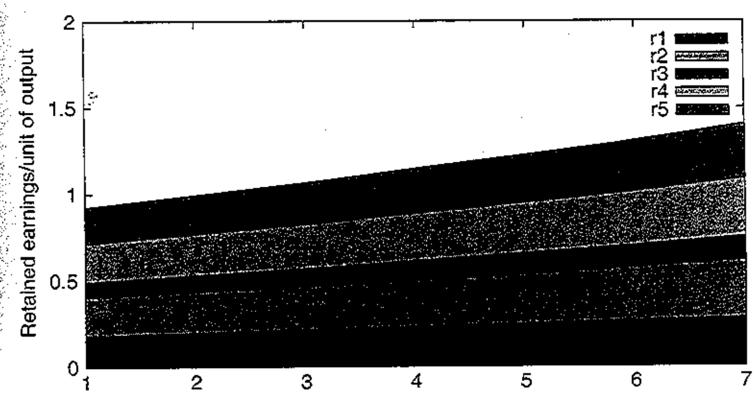

Figure 5.2 Retained earnings through simulated time.
Source: Author's calculations.

does not generate full employment. Labor productivity through technological progress makes labor redundant and the earnings saved through the expulsion of labor are transferred to profits for accumulating additional capital (which further creates conditions for labor to become obsolete in the future!) The change in the technical composition of capital towards the production of profits becomes the "formative element" of accumulation and economic growth. As in Marx:

> This change in the technical composition of capital, this growth in the of the mass of the means of production, as compared with the mass of the labour-power that vivifies them, is reflected in its value-composition by the increase of the constant constituent of capital at the expense of the variable constituent. . . . This law of the progressive growth of the constant part of capital in comparison to the variable part. . . . [A]ll methods of raising the social productivity of labor . . . are at the same time methods for increased production of surplus value or surplus product, which is in turn the formative element of accumulation. (Marx 1990, 773–775)

Such being the case, the simulations illustrate changes to the technical composition of capital and the creation of surplus value in the form of higher profits. This redistribution allows for economic growth, depicted by higher rates of GDP and total output, but creates a detrimental effect on wage laborers reflected by a fall in aggregate wage income and aggregate consumption and higher rates of unemployment as illustrated in figure 5.3.

Table 5.4 details the full simulation results over seven periods for all economic sectors and the economy as a whole. Aggregate wages and aggregate

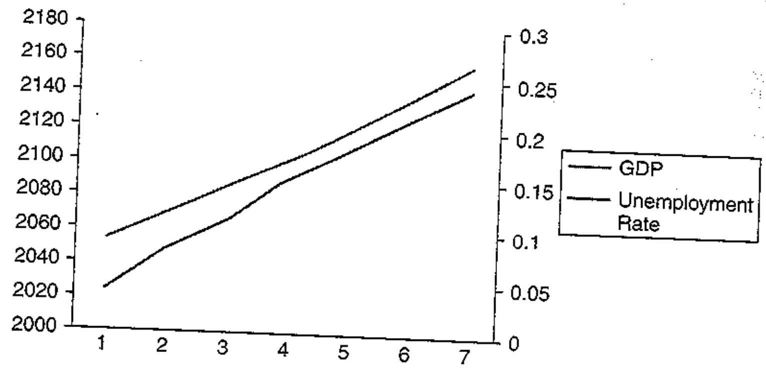

Figure 5.3 GDP and unemployment rates.

Source: United States Bureau of Labor Statistics.

consumption fall as time progresses; this corresponds to an increase in profits, which furthers investment. Investment expenditure becomes the driver of economic growth. GDP and total output increase over all seven periods. On the other hand, consumption as a share of GDP steadily declines over time. At the initial period, the consumption-GDP ratio stood at 56.8 percent. After technological advancement, the share of consumption spending relative to total GDP fell to 50.6 percent.

US consumption rates as a percentage of GDP are much higher than what are simulated here. However, it is not the absolute data that are important, but rather the patterns of movement in the data over time. The drop in consumption as a share of GDP in the simulations is representative of the drop in US consumption spending as a share of total GDP since the onset of the Great Recession. This fact is evidenced by figure 5.4, which displays the drop in Real Personal Disposable Income (PDI) for the United States. In 2009 when the US recession "officially ended," real PDI slightly rebounded and is now stagnating up to the present day. These results are consistent with the drop in wage income depicted by the base-model simulations in figure 5.1.

In addition, the base-model simulations predict that the savings in the wage bill are retained in the form of corporate profits to be used for financing investment activity. As figure 5.2 demonstrates, profits per unit of output steadily rise for every sector over the course of time. This behavior is consistent with recent US experience. Coming out of the recession in 2009, as real PDI stagnates, US corporate profits have been on the rise. As predicted from the simulations, corporate profits have been the driving force behind the current growth in US GDP. Figure 8.5 illustrates

Table 5.4 Input-output base-model simulations; periods one–seven

Input/Output	A	B	C	D	E	Intermediate Output	Consumption	Investment	GDP	Total Output
Period One										
A	103	20.6	51.5	360.5	206	741.6	247.5	206	453.5	1195
B	82.4	41.2	20.6	144.2	154.5	442.9	148.5	154.5	303	754
C	309	10.3	61.8	422.3	309	1112.4	267.3	123.6	390.9	1503.3
D	206	51.5	61.8	82.4	154.5	556.2	287.1	226.6	513.7	1069
E	92.7	36.05	41.2	206	123.6	499.55	217.8	175.1	392.9	892.45
Intermediate Purchases	793.1	159.65	236.9	1215.4	947.6	3352.65	–	–	–	–
Wages	233.64	233.64	233.64	233.64	233.64	–	1168.2	–	–	–
Retained Earnings	206	154.5	123.6	226.6	175.1	–	–	885.8	–	–
Total Value Added	439.64	388.14	357.24	460.24	408.74	–	–	–	2054	–
Total Income	1232.74	547.79	594.14	1675.64	1356.34	–	–	–	–	5406.65
Period Two										
A	106.09	21.22	53.05	371.32	212.18	763.85	245.03	212.18	457.21	1221.05
B	84.87	42.44	21.22	148.53	159.14	456.19	147.02	159.14	306.15	762.34
C	318.27	10.61	63.65	434.97	318.27	1145.77	264.63	127.31	391.94	1537.71
D	212.18	53.05	63.65	84.87	159.14	572.89	284.23	233.4	517.63	1090.51
E	95.48	37.13	42.44	212.18	127.31	514.54	215.62	180.35	395.98	910.51
Intermediate Purchases	816.89	164.44	244.01	1251.86	976.03	3453.23	–	–	–	–
Wages	231.3	231.3	231.3	231.3	231.3	–	1156.52	–	–	–
Retained Earnings	212.18	159.14	127.31	233.4	180.35	–	–	912.37	–	–
Total Value Added	443.48	390.44	358.61	464.7	411.66	–	–	–	2068.91	–
Total Income	1260.38	554.88	602.62	1716.56	1387.68	–	–	–	–	5522.12

continued

Table 5.4 Continued

Input/Output	A	B	C	D	E	Intermediate Output	Consumption	Investment	GDP	Total Output
Period Three										
A	109.27	21.85	54.64	382.45	218.55	786.76	242.57	218.55	461.12	1247.88
B	87.42	43.71	21.85	152.98	163.91	469.87	145.54	163.91	309.45	779.33
C	327.82	10.93	65.56	448	327.82	1180.15	261.98	131.13	393.11	1573.25
D	218.55	54.64	65.56	87.42	163.91	590.07	281.39	240.4	521.79	1111.86
E	98.35	38.25	43.71	218.55	131.13	529.97	213.47	185.76	399.23	929.2
Intermediate Purchases	841.4	169.37	251.33	1289.42	1005.31	3556.83	–	–	–	–
Wages	228.99	228.99	228.99	228.99	228.99	–	1144.95	–	–	–
Retained Earnings	218.55	163.91	131.13	240.4	185.76	–	–	939.75	–	–
Total Value Added	447.54	392.9	360.12	469.39	414.75	–	–	–	2084.7	–
Total Income	1288.94	562.27	611.45	1758.81	1420.06	–	–	–	–	5641.52
Period Four										
A	112.55	22.51	56.28	393.93	225.1	810.37	240.15	225.1	465.25	1275.62
B	90.04	45.02	22.51	157.57	168.83	483.97	144.09	168.83	312.92	796.88
C	337.65	11.26	67.53	461.46	337.65	1215.55	259.36	135.06	394.42	1609.97
D	225.1	56.28	67.53	90.04	168.83	607.77	278.57	247.61	526.18	1133.96
E	101.3	39.39	45.02	225.1	135.06	545.87	211.33	191.34	402.67	948.5
Intermediate Purchases	866.64	174.45	258.87	1328.1	1035.47	3663	–	–	–	–
Wages	226.7	226.7	226.7	226.7	226.77	–	1133.5	–	–	–
Retained Earnings	225.1	168.83	135.06	247.61	191.34	–	–	967.94	–	–
Total Value Added	451.8	395.53	361.76	474.31	418.04	–	–	–	2101.44	–
Total Income	1318.44	569.98	620.63	1802.41	1453.51	–	–	–	–	5764.97
Period Five										
A	115.93	23.19	57.96	405.75	231.85	834.68	237.75	231.85	469.6	1304.28
B	92.74	46.37	23.19	162.3	173.89	498.49	142.65	173.89	316.54	815.03
C	347.78	11.59	69.56	475.3	347.78	1252.02	256.77	139.11	395.88	1647.9
D	231.85	57.96	69.56	92.74	173.89	626.01	275.79	255.04	530.83	1156.84
E	104.33	40.57	46.37	231.85	139.11	562.25	209.22	197.08	406.29	968.54
Intermediate Purchases	892.64	179.69	266.63	1367.94	1066.53	3773.44	–	–	–	–
Wages	224.43	224.43	224.43	224.43	224.43	–	1122.17	–	–	–
Retained Earnings	231.85	173.89	139.11	255.04	197.08	–	–	996.98	–	–
Total Value Added	456.29	398.32	363.55	479.47	421.51	–	–	–	2119.14	–
Total Income	1348.93	578.01	630.18	1847.42	1488.04	–	–	–	–	5892.58
Period Six										
A	119.41	23.88	59.7	417.92	238.81	859.72	235.37	238.81	474.18	1333.9
B	95.52	47.76	23.88	167.17	179.11	513.44	141.22	179.11	320.33	833.77
C	358.22	11.94	71.64	489.56	358.22	1289.58	254.2	143.29	397.49	1687.06
D	238.81	59.7	71.64	95.52	179.11	64.79	273.03	262.69	535.72	1180.51
E	107.46	41.79	47.76	238.81	143.29	579.12	207.13	202.99	410.11	989.23
Intermediate Purchases	919.42	185.08	274.63	1408.98	1098.53	3886.64	–	–	–	–
Wages	222.19	222.19	222.19	222.19	222.19	–	1110.95	–	–	–
Retained Earnings	238.81	179.11	143.29	262.69	202.99	–	–	1026.88	–	–
Total Value Added	461	401.3	365.48	484.88	425.18	–	–	–	2137.83	–
Total Income	1380.42	586.38	640.11	1893.86	1523.71	–	–	–	–	6024.47
Period Seven										
A	122.99	24.6	61.49	430.46	245.97	885.51	233.02	245.97	478.99	1364.5
B	98.39	49.19	24.6	172.18	184.48	528.85	139.81	184.48	324.29	853.14
C	368.96	12.3	73.79	504.25	368.96	1328.26	251.66	147.58	399.24	1727.51
D	245.97	61.49	73.79	98.39	184.48	664.13	270.3	270.57	540.87	1205
E	110.69	43.05	49.19	245.97	147.58	596.49	205.05	209.08	414.13	1010.62
Intermediate Purchases	947	190.63	282.87	1451.25	1131.48	4003.24	–	–	–	–
Wages	219.97	219.97	219.97	219.97	219.97	–	1099.84	–	–	–
Retained Earnings	245.97	184.48	147.58	270.57	209.08	–	–	1057.69	–	–
Total Value Added	465.94	404.45	367.55	490.54	429.05	–	–	–	2157.52	–
Total Income	1412.95	595.08	650.42	1941.79	1560.53	–	–	–	–	6160.77

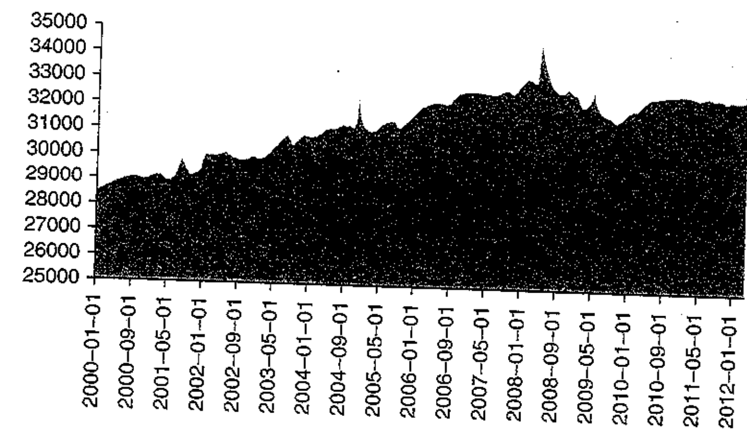

Figure 5.4 Real personal disposable income (2005 chained dollars).
Source: United States Bureau of Labor Statistics.

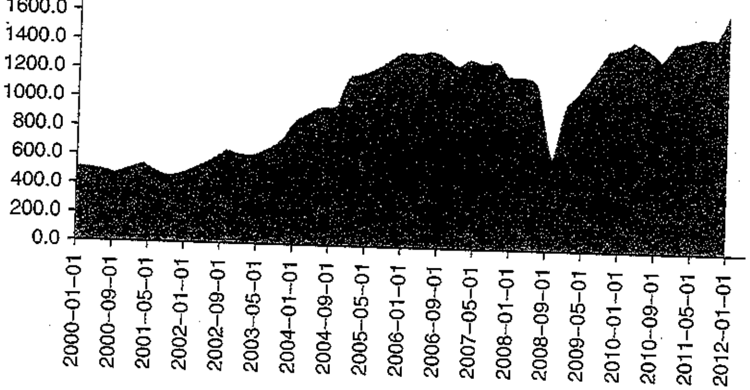

Figure 5.5 US corporate profits (2000–2012).
Source: US Census Bureau, Statistical Abstract of the United States.

the rise in US corporate profits following the recession. Together, the empirical data presented in figures 5.4 and 5.5 are consistent with the base-model simulations and the full input-output simulations presented in table 5.4.

To gain a better understanding of what is being presented in the simulations; specifically the interacting effects of Keynesian unemployment with structural unemployment, let us isolate the effects of a growing population

coupled with technological progress just after one period of time and analyze the results step by step.

In our model, at period (t+1) the population (and the labor force) grew at 3 percent and equates to a population of 1,216 people. Now of those 1,216 there were 1,180 people previously employed at the initial period. This leaves 36 new workers looking for employment after the first year, who cannot find employment because the current level of activity meets current demand expectations. This is the traditional Keynesian aggregate demand problem. However, over time demand expectations change as the additional population begins demanding products first to meet their basic needs, and then on their wants and conspicuous products. This change in business expectations causes a change in the behaviors of the capitalist class.

To meet this demand requires additional investments from capitalists in sectors A–E. Members of the capitalist class (the corporate CEOs in sectors A through E) are in heated competition with each other for both market share and profits. Thereby, capitalists are compelled to innovate, and are driven by such motivations. As such, capitalists do innovate and labor becomes more productive. Labor productivity increases by 4 percent, and the new machines expel a portion of the workforce. The total addition to the workforce becomes the difference between the growth rate and labor productivity, or, in the current simulation, minus 1 percent. Consumption falls by 1 percent and employment falls to 1,169.

The labor force added 36 workers because of population growth. However there were no job opportunities in the private sector. The unemployment problem became magnified when twelve additional employees were expelled from the labor force because of increased mechanization. After the first period a total of 48 workers were unemployed.

Over time continued technological progress potentially leads to the occurrence where labor makes up such a small component of production that it can be envisioned that production entails commodities producing commodities. The working class becomes marginalized. As Marx put it:

> In proportion as the bourgeoisie, i.e., capital, is developed, in the same proportion is the proletariat, the modern working class, developed—a class of labourers, who live only so long as they find work, and who find work only so long as their labour increases capital. (Marx 1965, 68)

The laboring class becomes worse off with technological advancement; however, capitalists become better off with a smaller wage bill. In the simulations, capitalists' profits increased to $885.80. Aggregate demand rises as the savings in the wage bill is turned over to profits and then towards investment spending which also stands at $885.80. Increased profits validate business investment in newer technologies, which will stimulate another round of investment activity over the next period (Minsky 1986). GDP rises from $2,040 to $2,054, and total output rises from $5,295 to $5,406.65. The simulations clearly depict economic growth, but GDP is still well below potential GDP because of both Keynesian and technological unemployment, which is reflective of jobless growth or a jobless recovery.

Employer of Last Resort in a Leontief Input-Output Model

The simulations from the base-model conclude that a free market economy exhibiting population growth and technological advancements is incompatible with maintaining full employment.

> [T]he fulfillment of [the effective demand condition] at any given time, no longer automatically entails that it will remain fulfilled through time... [E]ven if full employment of the labour force and full capacity utilisation are realised at a given point in time... the structural dynamics of the economic system cause that position to change and therefore make it impossible in general to maintain full employment through time. (Pasinetti. 1981, 87)

If full employment is to be maintained through time, it must be a direct agenda for government policy. The ELR program is one solution that allows competitive economies to maintain full employment, without hindering private sector advancement and ingenuity. The key is that goods and services produced by ELR employment do not compete with the private sector.[9] The government's role as a sector in the economy is for the welfare of its citizens. This role is left unchanged with the implementation of an ELR program.

The government is the only sector in a capitalist economy that can divorce itself from the profit motive and engage in production whose only outcome is that it benefits the welfare of the public. This standard is how an ELR project is measured. The private sector does not have this privilege which is why a self-regulating market can never achieve full employment. Private sector businesses must have pecuniary objectives, which is a natural consequence of doing business in a competitive society. Full employment must be an actively pursued policy agenda.

> The policy problem is to develop a strategy for full employment that does not lead to instability, inflation, and unemployment. The main instrument of such a policy is the creation of an infinitely elastic demand for labor... that does not depend upon long- and short-run profit expectations of business. Since only government can divorce the offerings of employment from the profitability of hiring workers, the infinitely elastic demand for labor must be created by government. (Minsky 1986, 308)

An ELR program further allows for variability in the technique of production while maintaining full employment. The government operates with its own set of rules. Their objective are toward the macro goals of societal welfare, the profitability of individual ELR projects is of no concern. Further, the government itself is not concerned about final demand of ELR services, because "they themselves determine the purpose of investment and what its final output is to serve" (Lowe 1987b, 107).

Unlike private businesses, public sector employment is not dependent upon the prior construction of real capital goods (Lowe 1987a, 1976). This statement is not to mean that an ELR sector will not utilize intermediate inputs. In fact, they most likely will, and the inputs that the ELR sector requires will be specific toward specific types of public sector projects. Nevertheless, public sector employment can forego automation and be as labor intensive as required, a luxury that is not available for private businesses (Forstater 2006; Wray 1998). The utilization of technology would be employed to complement the labor force, not replace it. Such circumstances for the utilization of capital equipment would be for training and for certification which are marketable in the private sector. There is also a vast array of pure services in the fields of health, education, community services, environmental cleanup, construction of public infrastructure, green jobs, and many more (Wray 1998).

ELR-Model Simulations

To illustrate the effectiveness of the ELR program, the same simulations will be conducted for the ELR-model as was conducted upon the base-model. The key difference between the simulations is that the ELR-model replicates the base-model and then implements the ELR program. The first step is to add in the government and ELR sector into the original base-model input-output table from table 5.1.

The ELR sector will utilize no intermediate inputs and will require only labor. The ELR sector will typically use both intermediate capital inputs and labor for production of goods and services. Capital inputs are strictly dependent upon the work performed by a specific ELR project and the needs of the regional community (Murray 2012). Given the capital specificity of ELR projects, as a first pass we assume that the ELR sector uses labor as its only input and produces pure services (Wray 1998). For the analysis, assume the ELR sector pays workers a wage equal to that of the private sector to eliminate a one-time cost-push inflation.[10]

Table 5.5 illustrates the ELR-model at the initial period. Initially there are no workers employed in the ELR sector and no ELR output produced (because of our assumption of initial full employment). Column and row vectors of zero for the ELR sector, and a column of zeros for government purchases represent this scenario.

SIMULATIONS OF TECHNICAL PROGRESS AND AGGREGATE DEMAND IN AN ELR-MODEL ECONOMY

Simulations of the effects of continual structural and technological change are performed for the ELR-model so a comparison may be made with the base-model. As with the base-model, allow for a growth rate of 3 percent and a rate of labor productivity at 4 percent. Table 5.6 depicts the simulation results for the ELR-model after one period.

From table 5.6, the ELR workers provide services that enhance public welfare; so unlike the other industrial sectors in the economy, there is no private sector demand for ELR services. The ELR produces "free goods and services," much like the New Deal programs of the Great Depression era. The purpose of the ELR program is not to make a profit but to provide employment to those who are unemployed while simultaneously retraining laborers and providing public works. Therefore, it follows that there are also no profits earned for the ELR program. This does not mean that specific ELR projects cannot be profitable; it simply means that the profit motive is not the primary objective of ELR projects. Here the extreme case is taken and it is assumed that the ELR program earns absolutely no revenue.

After one period, additional wage income of newly hired ELR workers is $31.96 and expended on consumer goods. Here we assumed an equal division of consumer expenditures across sectors A through E. This is certainly only one of many possible scenarios.

For instance, Lavoie (1994) would most likely contend with this over-simplification, as consumption is based upon a hierarchy of needs. There are primary needs that are necessary for survival. Once these needs are satisfied, consumers move to another bundle of needs. In that sense all needs are not equal. By contrast, wants evolve from needs. Social norms and customs, and individual behaviors and desires determine people's wants. Wants are dynamic and evolve over time with new product innovations and societal changes. Thorstein Veblen describes the evolution of wants from the framework of conspicuous consumption and pecuniary emulation, in a

Table 5.5 Hypothetical ELR-model input output table; initial period

Industry/ Commodity	A	B	C	D	E	ELR	Intermediate Output	Consumption	Investment	Government Purchases	GDP	Total Output
A	100	20	50	350	200	0	720	250	200	0	450	1170
B	80	40	20	140	150	0	430	150	150	0	300	730
C	300	10	60	410	300	0	1080	270	120	0	390	1470
D	200	50	60	80	150	0	540	290	220	0	510	1050
E	90	35	40	200	120	0	485	220	170	0	390	875
ELR	0	0	0	0	0	0	0	0	0	0		
Intermediate Purchases	770	155	230	1180	920	0	3255	–	–	–	–	–
Wages	236	236	236	236	236	0	–	1180	–	–	–	–
Profits	200	150	120	220	170	0	–	–	860	–	–	–
Total VA	436	386	356	456	406	0	–	–	–	–	2040	–
Total Income	1206	541	586	1636	1326	0	–	–	–	–	–	5295

Table 5.6 Hypothetical ELR-model input output table; period = 1

Industry/ Commodity	A	B	C	D	E	ELR	Intermediate Output	Consumption	Investment	Government Purchases	GDP	Total Output
A	103.81	20.86	51.82	362.67	208.17	0	747.33	256.94	207.63	0	464.57	1211.9
B	83.05	41.72	20.73	145.07	156.13	0	446.7	157.94	156.46	0	314.4	761.1
C	311.44	10.43	62.19	434.84	312.27	0	1131.17	276.74	124.37	0	401.11	1532.28
D	207.63	52.15	62.19	82.9	156.13	0	561	296.54	227.96	0	524.5	1085.5
E	93.43	35.5	41.46	207.23	124.91	0	502.53	227.24	176.95	0	409.19	911.72
ELR	0	0	0	0	0	0	0	0	0	0		
Intermediate Purchases	863.73	160.66	238.39	1232.71	957.61	0	3388.73	–	–	–	–	–
Wages	235.49	236.6	235.11	235.05	236.11	31.9	–	1215.4	–	–	–	–
Profits	207.63	156.46	124.37	227.96	176.95	0	–	–	893.37	–	–	–
Total VA	443.12	393.06	359.49	464.07	413.02	31.9	–	–	–	–	2105	–
Total Income	1306.85	553.72	597.88	1675.64	1370.63	31.9	–	–	–	–	–	5453.85

way "keeping up with the Joneses." Consumers desire goods because others have them.

Both the hierarchy of needs and the evolution of wants suggest that ELR wage income will most likely be skewed to those sectors that produce necessities and service basic needs and have a minimal effect on those sectors that satisfy higher end wants. Thus the assumption made here is an over simplification, but analyzing consumption behavior out of ELR income is beyond the scope of this chapter. So, as a first pass the assumption is made that ELR wages are expended evenly across sectors.

For the ELR-model, consumption expenditures per sector increased by $9.44 and aggregate consumption increased to $12,515.40. This result contrasts the results for the base-model, which resulted in a drop of consumption to $1,168.20 after one period. The growth in private sector consumption is in stark contrast to the reduction of private sector spending in the base-model.

Consumption generated by ELR income means additional inputs are needed in the private sector, including labor inputs, than prior to the implementation of the ELR program. It is seen from the base-model compared to the ELR-model that after one period, all inputs, including labor inputs, have increased in the ELR-model.

The jobs generated by additional consumption demand from ELR workers results in the demand for 16 additional private sector workers.[11] Businesses pull employees from the ELR sector and the aggregate wage bill rises with the ELR program (compare the "wages column" of table 5.6 to the wages column of table 5.4, period one). Average variable costs still fall at the same rate in the ELR-model as with the base-model, and the profit per unit is the same in both the ELR-model and the base-model. After the implementation of the ELR, private sector employment still falls short of full employment leaving a proportion of the labor force remaining in ELR employment.

Intermediate output increased in the ELR-model to $3,383.73 from $3,352.65 in the base-model. The newer, more profitable technology is still in place in the private sector, even after the introduction of the ELR. Thus additional demand for private sector products means additional profit for capitalists. After the introduction of the ELR, business profits increased from $885.80 to $893.37, reflecting the additional output sold. The additional profit is a modest increase, but nevertheless the conclusion remains the same—the ELR program does not compete with the private sector, but rather allows private sector businesses to reach their full potential and achieve maximum earnings.

GDP has grown significantly after the introduction of the ELR program. The government was not assumed to be a component to final demand in either simulation. The federal government simply employed ELR workers, paying their wages, and the ELR wage income was spent on additional consumption goods and services throughout the private sector. As consumption demand grew, so did businesses profits, and in turn the level of investment across sectors increased. This additional investment demand set off a further increase in the demand for intermediate inputs, which further increased the demand for labor in the private sector.

However, in this model, the increase in the demand for laborers does not spur another round of stimulus from consumption expenditure. Additional workers demanded by businesses have come from the ELR sector; and these workers are already consuming. There is simply a shift in employment from the ELR sector to the private sector and from expending ELR wage income to expending private sector wage income.

The conclusion from the ELR-model simulations is that actual ELR employment, after multiplier effects have set it in, is less than initial ELR employment. However, it should be noted that the multiplier effects in these simulations are conservative estimates and the actual multiplier effect would be greater. Here we considered only the multiplier effects created by an increase in the final demand for consumer goods. In reality, the ELR program would set off both demand and supply side multipliers. This would crate a greater multiplier effect than what was generated here, and would allow for more workers to be shifted over to private sector employment.

The reason for omitting supply-side effects in these simulations is that these effects would be unique to specific ELR jobs. For example, one of the most popular ELR-type New Deal programs was the Civilian Conservation Corp (CCC). Part of the projects of the CCC was the construction of service buildings, fire lookout stations, roads, bridges, and other structural improvements. ELR employment in structural development and improvement generates demand for lumber, steel, iron, cement, glass, heavy machinery, hand tools, and many other inputs. The demand by the ELR sector for capital inputs induces investment in these sectors in addition to the induced investment in the consumer goods sectors set off by the increase in wage income by ELR workers.

One more point of note regarding the ELR wage. The ELR exogenously sets the marginal price of labor by setting the Basic Public Sector Wage (BPSW) (Wray 2002), a uniform wage for all ELR workers. The ELR wage may be the existing statutory minimum wage, or it may pay living wages. Either way, by doing so the ELR creates a wage anchor. The private sector would likely pay a wage incrementally above the ELR wage to attract workers out of the ELR program.

When the BPSW was set at the minimum wage, the shift of workers from private sector employment to ELR employment would create a drop in aggregate consumption and a possible shift in the composition of consumption demand. For example, consistent with current US experience, the employment in the construction and equipment sector has lagged behind other sectors during the fragile recovery. It would be likely that these workers would be employed in the ELR sector, perhaps doing structural improvements similar to the CCC programs (without the age limitations) of the New Deal. The 2010 median annual salary for those in construction industry is estimated as: construction and equipment operators $38,490; electricians $48,250; drywall and ceiling tile installers and tapers $38,290; construction building and inspectors, $52,360; cement masons $35,530.

If the BPSW is equal to the federal minimum wage and it was set for all ELR workers, then all ELR workers, regardless of occupation would earn only $14,500 annually (based on $7.25 per hour and 2,000-hour work year). Thus, those in the construction industry would earn less than half of their previous income. Certainly, any wage is better than no wage; but what will likely happen is that there would be a change in the composition in the demand for consumer goods and services toward necessary goods and services. Surely, the federal government can control the extent of this drop by setting the ELR wage. If the ELR wage were only marginally lower than private sector wages these effects will diminish and could potentially be insignificant.

A uniform basic public sector wage has the additional advantage of maintaining price stability. Think of a buffer stock scheme in which the government sets a price floor for a good, and the federal government stands ready and willing to purchase that good when the price reaches that mark. Further, the government stands ready and willing to sell that good at a specified price ceiling. By doing so, the federal government creates macroeconomic stability by preventing prices from falling below a floor or rising above a ceiling. In the ELR-model, by creating a price floor (set at $1.00) the ELR anchors the wage. The simulations reflect the BPSW proposals.

The simulations also reflect the wage proposal favored by Harvey (1989, and this volume). Harvey argues that ELR workers should be paid market wages for similar skills. In the model, all sectors of the economy, including the ELR sector, are paid the uniform wage of $1.00. (The market wage is the ELR wage. Of course this is unrealistic, however the simulations detail the effects of tying the ELR to the market wage for similar occupations.) In this scenario, the effects seen are that a shift in employment from the private sector to the ELR sector completely stabilizes personal disposable income. The shift over to the ELR sector would not result in a lower standard of living, and will not result in a change in the composition of consumption. If the ELR sector were to pay market wages, the simulations reflect Harvey's scenario. The ELR program still provides a wage anchor by setting a price floor on wages, and achieves price stability (see Harvey, this volume, chapter 2).

Conclusion

The ELR approach to full employment is more effective than current policy approaches to the problem of unemployment. The simulations, albeit simple, produced results that mirror the outcomes suggested by the ELR literature. The macroeconomic effects to the ELR-model over the base-model are increased aggregate wages in the ELR-model; increased consumption in the ELR-model; increased private sector profits in the ELR-model; and an inducement of private sector investment in the ELR-model leading to a shift of workers away from the ELR program into the private sector, all leading to higher total output and higher levels of GDP for economies operating and ELR program. From this initial setup, a more complete study could be accomplished utilizing historical input-output data, and employment data, with estimates of labor productivity and factoring in forecasted growth in the labor force.

These are purely quantitative results. Omitted here are the economic and noneconomic benefits to employment, such as increased morale, reduction in crime, increased education and training, rebuilding infrastructure (green infrastructure), building better communities, reducing social and racial antagonism, and other many more positive social benefits (Wray and Forstater 2004).

The ELR program becomes important in maintaining skills and retraining the workforce given technological and structural change. As technology improves, and improves more rapidly, the skills of the workforce need to be just as dynamic. The unemployed suffer the dual problem of losing previously acquired skills, but also do not develop new skills for new techniques. Thus, the duration of unemployment matters. The ELR sector can counteract this by offering continual training to help maintain a skilled workforce.

The primary objective of the chapter was to demonstrate how the ELR approach to full employment contemporaneously addresses both structural unemployment and Keynesian unemployment while coordinating with private sector in response to the market rather than competing with the private sector. There are certain limitations to the simulations provided in the

chapter. As with all attempts to model economic behavior, the conclusions followed from the assumptions made. The assumptions attempted to model the economic reality for our current period.

Notes

1. A notable exception is Luigi Pasinetti 1981. See also Forstater 1998; 2002.
2. Constant return to scale is a simplifying assumption as a first pass. The effects of increasing returns to scale easily are simulated.
3. For a handbook on conducting economic impact studies with regional multipliers see www.bea.gov/scb/pdf/regional/perinc/meth/rims2.pdf.
4. For further information of REMI forecasts see the webpage for *Regional Economic Modeling Incorporated*: www.remi.com.
5. This assumption follows the structural dynamic modeling of Pasinetti's approach (1993; 2007). Harald Hagemann would disagree arguing that technical progress should be an endogenous variable as the diffusion of new technologies is dependent upon inputs of interrelated industries (Hagemann 1992, 44–48). *It is not the purpose of the current essay to model technical progress so as a first pass will be treated as exogenous.*
6. For a nice summary of the effects of technological progress for U.S., see Heilbroner and Milberg 2012.
7. Investment is for the most part financed out of retained earnings. In nonrecession years, retained earnings finance over 90 percent of total investment see, Albert M. Teplin 2001. "U.S. Flow of Funds Accounts and Their Uses," 87 *Federal Reserve Bulletin*, no. 43, and also see Harcourt and Kenyon (1976).
8. These assumptions are very similar to Marx's analysis of capital accumulation. Capital accumulation "comes to fruition through a progressive qualitative change in its composition, i.e. through a continuing increase of its constant component at the expense of its variable component (Marx 1990, 781). In Marx's analysis of the capitalist process capital accumulation and technological progress go hand in hand. Therefore, capital accumulation also causes technological unemployment. Laborers are the source of technical progress, so they create conditions which make themselves superfluous, they become part of the "surplus population" (Marx 1990, 784).
9. For this issue, and a nice overview of the key ingredients of an ELR program see Pavlina Tcherneva (2003), also see Pavlina Tcherneva's chapter in this volume.
10. More on ELR wages and wage effects in the final section.
11. This multiplier effect is generated from an increase in consumption demand. In reality this is only the partial effect, once capital goods for ELR production are introduced there would be supply-side and demand-side multipliers. For an economic impact study of the effectiveness of the ELR program for a regional economy see Murray 2012.

REFERENCES

Blinder, A. 1994. "On Sticky Prices: Academic Theories Meet the Real World." In *Monetary Policy* NBER Studies in Business Cycles vol. 29. Edited by N. G. Mankiw. Chicago and London: The University of Chicago Press.

Courvisanos, J. and C. Richardson. 2008. "Invention, Innovation, Investment: Heterodox Simulation Modeling of Capital Accumulation." In *Future Directions for Heterodox Economics*. Edited by J. Harvey and R. Garnett. Ann Arbor: The University of Michigan Press, 185–224.

Estevão, M. M. and E. Tsounta. May 2011."Has the Great Recession Raised U.S. Structural Unemployment?" *IMF Working Papers*, 1–46.

Forstater, M. 1998. "Flexible Full Employment: Structural Implications of Discretionary Public Sector Employment." *Journal of Economic Issues* 32(2): 557–564.

———. 2002. "Full Employment Policies Must Consider Effective Demand and Structural and Technological Change." In *A Post Keynesian Perspective on Twenty-First Century Economic Problems*. Edited by Paul Davidson. Cheltenham: Edward Elgar.

———. 2006. "Green Jobs: Public Service Employment and Environmental Sustainability." *Challenge* 49(4): 58–72.

Gualerzi, D. and E. J. Nell. 2010. "Transformational Growth in the 1990s: Government, Finance and High-tech." *Review of Political Economy* 22(1): 97–117.

Hagemann, H. 1992. "Traverse Analysis in a Post-classical Model. In *Beyond the Steady-State: A Revival of Growth Theory*. Edited by J. Halevi, D. Laibman, and E. Nell. London: Macmillan, 235–263.

———. 1995. " Employment and Machinery." In *The Legacy of Hicks*. Edited by H. Hagemann, and O. Hamouda. New Brunswick: Routledge, 200–224.

Harcourt G. C. and P. Kenyon. 1976. "Pricing and the Investment Decisions." *Kyklos* 29(3): 449–477.

Harvey, Philip. 1989. *Securing the Right to Employment: Social Welfare Policy and the Unemployed in the United States*. Princeton: Princeton University Press.

———. 2006. "Funding a Job Guarantee." *International Journal of Environment, Workplace & Employment* 2(1): 114–132.

———. 2012. "Wage Policies and Funding Strategies for Job Guarantee Programs." In *The Job Guarantee: Toward True Full Employment*. Edited by M. J. Murray and M. Forstater. New York: Palgrave.

Heilbroner, R. and W. Milberg. 2012. *The Making of Economic Society*, 13th ed. Upper Saddle River, NJ: Pearson Education.

Hicks, J. 1973. *Capital and Time*. Oxford: Clarendon.

Kalecki, M. 1943. "Political Aspects of Full Employment." *Political Quarterly* 14(4): 322–331.

Keynes, J. 1964 (1936). *The General Theory of Employment Interest and Money*. New York: Harcourt Brace.

Laibman, D. 1992. "Optimal Choices of Technique and Biased Technical Change." In *Beyond the Steady State: A Revival of Growth Theory*. Edited by J. Halevi, D. Laibman, and E. Nell. New York: St. Martin's Press, 175–197.

Lavoie, M. 1994. "A Post Keynesian Theory of Consumer Choice." *Journal of Post Keynesian Economics* 16(4) (Summer): 539–562

Lee. F. S. 1998. *Post Keynesian Price Theory*. Cambridge: Cambridge University Press.

Lee, J., R. Pau, and D. Sandri. 2010. "U.S. Consumption Rates after the 2008 Crisis." *International Monetary Fund* SPN 10/01.

Lowe, A. 1965. *On Economic Knowledge*. New York: Harper and Row.

———. 1976. *The Path of Economic Growth* Cambridge: Cambridge University Press.

———. 1987a (1955). "Structural Analysis of Real Capital Formation." In *Essays in Political Economics: Public Control in a Democratic Society*. Edited by A. Oakley. New York: New York University Press, 60–106.

———. 1987b. *Has Freedom a Future?* New York: Praeger.

Luxemburg, R. 1951. *The Accumulation of Capital*. London: Routledge.

Marx, K. 1965. *The Communist Manifesto*. New York: Washington Square Press.

———. 1990. *Capital: A Critique of Political Economy*. Volume One. London: Penguin Classics.

———. 1991. *Capital: A Critique of Political Economy*. Volume Two. London: Penguin Classics.

Minsky, H. 1986. *Stabilizing an Unstable Economy*. New Haven, CT: Yale University Press.

Murray, M. J. 2012. "The Regional Benefits of the Employer of Last Resort Program." *Review of Radical Political Economics* 44(3) (September): 327–336.

Neisser, H. 1942. "'Permanent' Technological Unemployment: Demand for Commodities Is Not Demand for Labor." *American Economic Review* 32(1): 50–71.

Okishio, N. 1961. "Technical Change and the Rate of Profit." *Kobe University Economic Review* 7(1): 87–89.

Pasinetti, L. 1981. *Structural Change and Economic Growth*. Cambridge: Cambridge University Press.

———. 1993. *Structural Economic Dynamics*. Cambridge: Cambridge University Press.

———. 2007. *Keynes and the Cambridge Keynesians, A Revolution to Be Accomplished*. Cambridge: Cambridge University Press.

Pollin, R. 2003. *Contours of Descent: U.S. Economic Fractures and the Landscape of Global Austerity*. Brooklyn: Verso.

Ricardo, D. [1817] (edited by Piero Sraffa) 2004. *The Works and Correspondence of David Ricardo: On the Principles of Political Economy and Taxation*. Indianapolis, IN: Liberty Fund Press, Volume 1.

Ricardo, D. 2004. *On the Principles of Political Economy and Taxation*. Indianapolis, IN: Liberty Fund Press.

Robinson, J. 1965. *The Accumulation of Capital*. 2nd Edition. New York: St. Martin's Press.

Small I. and T. Yates. 1999. "What Makes Price Sticky? Some Survey Evidence for the United Kingdom." *Bank of England Quarterly Bulletin* (August): 262–270.

Stiglitz, J. 2003. *The Roaring Nineties*, New York: W. W. Norton.

Tcherneva, P. R. 2003. "Job or Income Guarantee." Working Paper 29, Center for Full Employment and Price Stability, Kansas City, MO.

———. "The Case for Labor Demand Targeting." *Journal of Economic Issues* 0(2): 401–410.

Wray, L. R. 1998. *Understanding Modern Money: The Key to Full Employment and Price Stability*, Cheltenham: Edward Elgar.

———. 2002. "Public Service Employment without Inflation." *Problemas del Desarrollo, Revisita Latinoamericana de Economica* 33(128).

Wray, L. R. and M. Forstater. 2004. "Full Employment and Social Justice." In *The Institutionalist Tradition in Labor Economics*. Edited by D. P. Champlin and J. T. Knoedler. Armonk, NY: M. E. Sharpe, 253–272.

CHAPTER 6

TRANSFORMATIONAL GROWTH, ENDOGENOUS DEMAND, AND A DEVELOPMENTAL ELR PROGRAM

EDWARD J. NELL AND GEORGE ARGYROUS

BOTH NEOCLASSICAL AND POST-KEYNESIAN GROWTH THEORY FAILS TO explain the determinants of the growth of demand. Historically, the growth of demand has depended on the changing structure of social classes, which in turn is also a key to the growth of productivity. Understanding this makes it possible to develop a simple theory in which the growth of demand is endogenous, and interacts with capital intensity, productivity, and relative shares. By defining a distinction between "collective" goods and "personal" goods, this model can be extended further to include the growth of government. Moreover, the Employer of Last Resort (ELR), which has hitherto been considered a countercyclical policy, can now be extended to questions of development, in economies in which there is a shortage of capital. The paper closes with comments on the limitations of theories of endogenous demand growth.

UNDERSTANDING THE GROWTH OF DEMAND

At present, neither conventional nor alternative approaches to economic theory provide much help in understanding the growth of demand, either