Introduction

It is possible to achieve full employment[1] with greater economic stability. The most effective method to generate stable full employment, this analysis argues, remains the implementation of an ELR. An ELR, in the most basic sense, is a government sponsored job guarantee program that takes workers where they are and as they are—like FDR's New Deal employment programs in response to the Great Depression. As evidenced in Figure 2.1, the current macroeconomic paradigm has continually demonstrated difficulty achieving, let alone sustaining, full employment and an ineptness at promoting economic growth without simultaneously amplifying the instability-prone nature of the current financial structure and employment strategy.

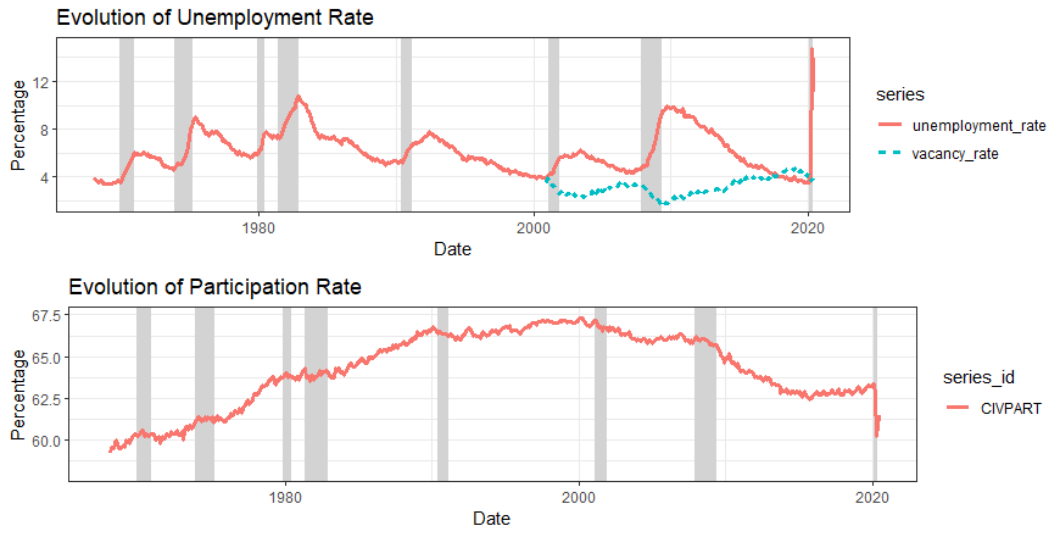

Figure 2.1. Evolution of Unemployment Rate and Labor Force Participation
Source: National Bureau of Economic Research and U.S. Bureau of Labor Statistics (n.d.a., n.d.b.)

[1] A widely accepted notion of full employment was succinctly stated by Nobel Laureate William S. Vickrey (1993) in his presidential address to the American Economic Association; according to Vickrey, full employment is defined "as a situation wherein there are at least as many unfilled job openings as there are unemployed individuals seeking work."

According to The National Bureau of Economic Research, there have been eight recessions over the previous five decades; across that same time span, the unemployment rate has averaged 6.1%. While the Job Opening and Labor Turnover Survey (JOLTS) data only dates to December of 2000, since its inception, the average of total non-farm job openings rate (NFJORATE) has been 3.1% and remains entirely below the unemployment rate across the available range until very recently; however, it was a very short-lived period of full employment. During the extended recovery from the 2007-09 recession, which recently ended with the current pandemic-induced recession, the unemployment rate fell, but it was accompanied by a simultaneous decline in the labor force participation rate; in fact, the labor force participation rate reached a low unseen since the late 1970s (U.S. Bureau of Labor Statistics, n.d.a.). It should be noted, however, that the unemployment rate presented in Figure 2.1 grossly understates the problem. The official unemployment rate does not include discouraged workers—the long-term unemployed who have become discouraged and given up their search. An increase in discouraged workers helps explain the declining labor force participation rate. Moreover, the story told by the unemployment rate fails to take into account the underemployed, including both workers who desire full-time work, but can only procure part-time work, employees who are overqualified, and as presented in Figure 2.2, the youths and historically disadvantaged groups who experience significantly higher unemployment rates.

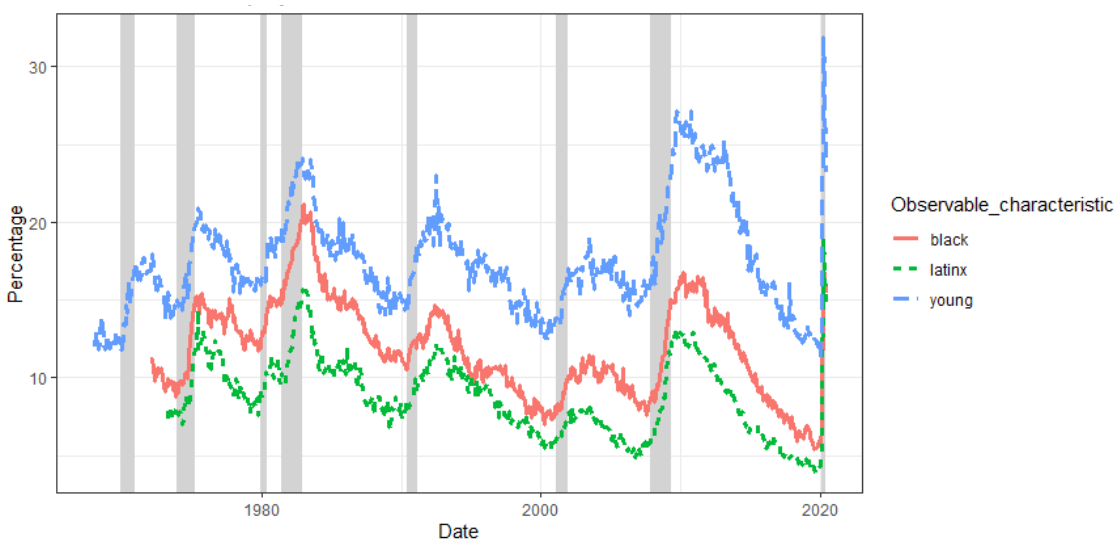

Figure 2.2. Evolution of Unemployment Rate by Race
Source: U.S. Bureau of Labor Statistics (n.d.a.)

If policy makers truly desire full employment, then there remains no doubt that contemporary policy has failed. At the root of this failure has been the gradual encroachment of ideas that, over the last several decades, has shifted the main concern of policy from full employment to controlling inflation. As a result of this transition, unemployment has developed into a chronic problem. Further compounding this problem, unemployment has been identified as a contributing factor to many other social problems (Harvey 2000; Mitchell and Muysken 2008). As Keynes acknowledged many years ago, "it is ideas, not vested interests, which are dangerous for good or evil" (Keynes, [1936] 1964, 351).

Theoretical Framework

Minsky's framework begins with the claim made by Keynes (1964, 372) in *The General Theory of Employment, Interest, and Money* that our economic system has two major faults: it fails to provide full employment and it fails to provide an equitable distribution of wealth and income. After acknowledging these two faults, Minsky continues his analysis by recognizing how "the structure of the economy affects economic performance, including the volume of, and

nature of, employment, growth, and inflation (Wray 2007). Acknowledging how structure affects economic performance allows a comprehensive understanding of the macro implications of two employment strategies explored by Minsky (1973): private investment and public employment.

Before examining the two employment strategies, this inquiry considers the structure of the capitalist economic system as described by Minsky (2008) in *Stabilizing an Unstable Economy*. The economy, according to Minsky, exists as a dynamic system moving through historical time in pursuit of profit. The institutional structure necessitates the utilization of expensive capital in production. The modern structure of production requires financing which emerges as a commitment on expected future cash flows: the financing of investment acts as an exchange of cash now for cash in the future. Current investment directly influences current profits; whereas future profits validate previous investments through an ability to meet associated cash commitments. It follows that current investment depends upon future investment: investment takes place today because agents expect that investment will take place in the future (Minsky, 2008).

Kalecki's (1971) profit equation further illustrates the importance of investment in determining profit.

$$\Pi = I - S_w + (G - T) + NX$$

Kalecki's profit equation states that aggregate monetary profit, Π, equals domestic private investment, I, minus aggregate savings of wage earners, S_w, plus the government's fiscal deficit, $(G - T)$, and net exports, NX. Given that the capitalists, those who earn profit, can decide to invest more, but cannot decide to earn more in any given period, Kalecki (1971) concludes that investment determines profit and not the inverse.

The private investment strategy, according to Minsky (1973, 2008), relies upon inducing investment to promote employment. This approach requires increasing the size and certainty of capital income. As capital income increases, it causes asset values to increase. The increase in income and asset values animates an increasing income capitalization rate. Increasing capitalization rates leads to increasing returns on capital and ultimately creates "a speculative, debt-financed investment boom." The private investment strategy depends upon various means to subsidize demand, including favorable financing conditions, fiscal inducements to invest, government contracts, transfer payments, and taxes. According to Minsky's analysis, the private investment strategy results in increased inequality and leverage, inflationary pressures, investment booms, and instability.

Following Minsky (2008), a simple skeletal model and some strong assumptions demonstrate how Minsky arrives at his conclusions for a strategy that relies upon increasing investment to generate employment and sustain profits. Let P_C be the price and Q_C the quantity of a representative consumer good, W_C the money wage rate and N_C the level of employment for the production of a representative consumer good, and W_I the money wage rate and N_I the level of employment for the production of a representative investment good. Assume there are only workers whose labor is directly related to the production of consumer and investment goods and the capitalists who receive profit; furthermore, assume that workers spend all of their wages on consumption goods while capitalists spend none of their profits. The simple equation used by Minsky to illustrate the dynamics of prices and profits takes the following form:

$$P_c Q_c = W_c N_c + W_I N_I$$

Let $A_C = N_C/Q_C$ and $\mu = W_I / W_C$, then simple algebra leads to:

$$P_c = \frac{W_c}{A_c}(1 + \mu \frac{N_I}{N_c})$$

Manipulation of the skeletal model suggests that, *ceteris paribus,* the price of the consumer good moves in the same direction as the level of employment in the investment good sector. When holding everything else constant, an increase in investment increases the level of employment in the investment sector. As employment in the investment sector increases, the price of consumer goods also increases. Thus, given the assumptions of Minsky's simple model, relying upon investment to promote employment creates inflationary pressures

The assumptions that labor is the only input and that workers spend all their wages means that profit in the consumption goods sector, π_c, appears as the difference between total spending on consumption and the wage bill in the production of consumption goods. Reinforcing Kalecki's (1971) conclusion, it becomes evident from the simple model that higher investment produces higher profits.

$$\pi_c = P_c Q_c - W_c N_c = W_I N_I$$

Introducing a temporal element and conceptualizing the investment-profit dynamic as a positive feedback loop elucidates how instability arises. Capital acquisition requires financing, which leaves a residue in the form of future financial commitments. Expectations of future profitability influences current investment, which in turn determines profits and thus the ability to meet financial commitments from previous investments. It follows that previous investment decisions are validated by current profit, and future profits determine the validity of current investment decisions. After this recognition, Minsky (2008, 163) concludes that investment happens today because it is expected to happen in the future. The self-reinforcing relation between investment and profit contributes to instability—an increase in investment boosts profits, which causes further increases in investment. The ensuing investment boom drives asset prices up, encouraging speculation and Ponzi financing positions. All it takes is a change in

expectations for the process to reverse course and trigger a contraction. The alternative strategy proposed by Minsky (1965, 1973, 2008) emphasizes public employment. The creation of an ELR serves as the key feature of this strategy. According to Minsky, an ELR provides full employment and increases both economic and price stability. It remains a monetarily sovereign government's ability to divorce the profit constraint from the employment decision that allows the achievement of full employment. An ELR creates an infinitely elastic demand for labor at an exogenously determined wage[2]. Minsky (1973, 99) then considers how an ELR increases economic stability: the public employment strategy remains "consistent with constraints upon private speculative finance." These constraints reduce the source of investment booms and impart "a strong underpinning to demand [which will] allow technical progress to induce investment and [will] not foster speculative booms." Moreover, this strategy results in a steady pace of investment and increased stability. As the economy transitions away from its reliance on private investment to stimulate economic activity, it reduces the inflationary pressures identified in the skeletal profit equation model above. Lastly, the ELR would promote price stability by acting as an anchor for the price of labor.

The Model

The following model seeks to demonstrate that the ELR increases economic stability in terms of output, employment, and prices. The model is Stock-Flow Consistent and utilizes System Dynamics to aid in understanding results of the simulations. System Dynamics allows an understanding of complex systems moving through time with delays that result from the accumulation and dissipation of stocks through flows (Sterman 2000). The key variables are

[2] A discussion about the exogeneity of the ELR wage and other policy variables are discussed in the section 3.1. Moreover, the relation between the ELR wage and price stability is considered in section 4.4.

identified, and the feedback loops assigned a positive or negative sign. To verify the stock-flow consistency, an accounting matrix is utilized to demonstrate the implications of each economic transaction (Godley and Lavoie 2007). Stock-flow consistency is achieved when every column and row for financial assets and transactions sums to zero. The exception are the rows that deal with tangible inventories and capital; real assets appear in the matrix as an asset that, unlike financial assets, are not counterbalanced by an offsetting liability.

The Institutional Setting and Key Assumptions

The first section describes elements of the institutional setting for the modeled economy—key features of the economic structure and processes associated with society's pursuit of social provisioning are outlined. After describing some of the most pertinent actions available to agents in the model and the rules which govern those actions, key assumptions of the model are explicitly stated in the second section. Due to the complexity of economic phenomena emerging from society's pursuit of social provisioning, it becomes necessary to distinguish the essential features most relevant to the question at hand. Simplifications achieved through assumptions are a feature of the model, not a flaw.

Key Elements of the Institutional Setting

1. The economy of the model is demand-led. Consumption, investment, and government expenditure determine the targeted level of employment. The level of employment is determined by a matching function and impacts the nominal wage demands of labor.
2. In a world of uncertainty, firms are required to form expectations and make decisions about production. Expectations are often wrong, and production takes time, both of which necessitate the need for endogenously created credit money—the need for a banking sector (Godley and Lavoie 2007, 2). In this model, banks create money

endogenously; money does not, as Friedman ([1969] 2005, 4) hypothesized, enter the economy exogenously as if dropped by a helicopter.

3. Labor is heterogenous and viscous, a key departure from previous SFC models which assume labor homogeneity.[3] The microeconomic dimensions of unemployment arising from labor heterogeneity generates flows of workers into and out of unemployment at a rate beyond what is necessary to accommodate desired changes in firm level employment (a more detailed discussion on this topic can be found in Discussion of Labor Market Flows). Moreover, the micro dimension creates frictions in the job-matching process, which act as a constraint on production. Firms circumvent these frictions through two mechanisms:
    a. Firms hold inventories which equate the quantity demanded with the quantity supplied when discrepancies exist between quantity demanded and what is produced or equivalently when discrepancies exist between expected and realized sales.
    b. Firms allow actual labor productivity to fluctuate across the business cycle—productivity is procyclical. During downturns capitalists hoard labor and during upswings they increase the intensity of effort required by labor (Fay and Medoff 1985).

[3] Under the standard assumption of labor homogeneity, Minsky (2013, 13-14) states that, any unemployment causes an infinitely elastic supply of labor at the going wage to all occupations. A key implication for labor market outcomes is that "it does not matter how demand is increased: no matter where or what kind of initial impact occurs and no matter what the pattern of final output may be, the employment and wage effects are the same." Minsky continues, stating that "labor is not homogenous and fluid. The gestation period of a worker with particular skills in a particular place may be quite time consuming and the gestation process quite costly. At every date there is a need […] to generate the right kinds of labor…" Simply assuming away the heterogeneous and viscous nature of labor greatly downplays the benefits afforded by the ELR.

4. The government in the model finances all expenditures through the creation of high-powered money; more specifically, the government credits reserves held by commercial banks at the central bank which, for simplicity, is amalgamated with the government. While there is no sale of bonds ex-post to drain excess reserves, it is assumed that the government pays interest on reserves to target its interest rate. It suffices to say that the government, which is monetarily sovereign, can afford to purchase whatever is for sale in the currency it issues.
5. Wage dynamics: the wage for those employed in the ELR is fixed while the wage for those employed in the private sector is determined as a markup over the ELR wage. The markup depends on the tightness of the labor market. The approach to wage dynamics adopted in this analysis parallels the NAIBER presented by Mitchell (1998).
6. Price dynamics: firms set prices as a markup over costs so that they may capture a portion of sales as profit.
7. Prices do not adjust to clear markets and equate the quantity supplied with quantity demanded; rather, the adjustment process occurs through what Zezza (2016, 439) describes as an error correction mechanism where one or more variables acts as a buffer.

Key Assumptions of the Model

1. Policy variables, including the policy interest rate and the ELR wage, are assumed to be exogenous. Policy makers and the economists who influence them are both observers of and participants in the economy (Lee 2017, 10). As participants in the economy, their decision about how to set these policy variables cannot be truly

exogenous; their view of the processes and outcomes is shaped by the specific socio-historical forces that determine their interpretation of the social reality. However, as observers, the policy makers can manipulate economic outcomes by exercising control over policy variables: they have the power to affect causality. Likewise, by assuming these variables are exogenous, causality is implied running from the policy variables to the dependent variables of import in the model (Dobb 1975, 7-9)

a. The policy interest rate paid on reserves is a decision made by the central bank (Federal Reserve 2020). The interest rate is adjusted according to central bankers' interpretation of economic outcomes and processes; however, it remains a policy decision. The Federal Reserve uses the policy interest rate as a tool to achieve maximum employment and average inflation of two percent. Using the interest rate as a tool to achieve their mandate implies in causality running from interest rate to output, employment, and prices.
b. Setting the ELR wage is a policy choice. The ELR wage is meant to serve as a price floor that remains independent of labor market tightness as it does not chase private sector wages upward. Independence from labor market conditions can be achieved because the ELR does not target a level of employment, but rather absorbs and releases workers according to the demand of the private sector—policy makers set the ELR wage and let the market determine the size of the program.

   The rate at which the ELR wage is set impacts distributional outcomes and prices. A higher ELR wage, *ceteris paribus,* increases incomes for workers at the bottom of the wage ladder. Moreover, the ELR wage rate affects wages in

the private sector and thus impacts prices through its influence on costs. The literature has established price stability as a primary goal of the ELR. The ability to impart price stability requires that the ELR wage not be directly influenced by market conditions. The wage must be determined as a policy decision and not allowed to fluctuate according to market outcomes; however, independence from market outcomes does not mean that the wage cannot be revised over time.

In the literature, causality runs from the ELR wage (i.e., the policy variable) to output, employment, and prices (i.e., the dependent variables of import), a dynamic which is reproduced in the model by assuming the ELR wage is exogenous.

2. The economy of the model excludes the foreign sector.
3. Matching frictions in the labor market are the only endogenous constraint to the supply process: production occurs instantaneously according to expected sales.

The Accounting Framework

The model has four sectors: households, firms, government, and banks. Households have been decomposed according to their source of income: workers receive wages while capitalists receive dividends and interest payments. The accounting matrix forms the core of the model and is presented in Tables 2.1 and 2.2. The matrix is broken down into two sections, which closely parallels the National Income and Flow of Funds methodology. The purpose of this framework is to describe "each sector's stock of assets and liabilities and their logical inter-relationship with those of other sectors" (Godley and Lavoie 2007, 59).

Table 2.1, titled “Behavioral Transactions Matrix,” contains two parts. The upper part presents the income and outlays of each sector and resembles the National Income and Product Accounts. Incomes and outlays are labeled with a “+” and “-” respectively. This section of the matrix describes the behavior of each sector at the time of the transactions (Godley and Lavoie 2007, 63). The lower portion of this table, resembling the Flow of Funds, serves to differentiate between sources (negative variation in assets and positive variation in liabilities) and uses (positive variation of assets and negative variation of liabilities) of funds, labeled with a “+” and “-” respectively. This section is interesting in that it reveals the flow of finance across sectors that are a result of the economic transactions described in the upper portion of this table. Furthermore, it is extremely useful when defining behavioral equations and formalizing the model (Godley and Lavoie 2007, 33). The subscripts $d,\ s,\ w,\ c,\ f,\ b,\ elr,$ and -1 utilized in this table and in the specification of the model below denote demanded, supplied, workers, capitalists, firms, banks, ELR, and a lagged variable or parameter value, respectively.

Table 2.2 is titled “Balance Sheet” and serves to differentiate between assets and liabilities denoted by a “+” and “-” respectively. In this model, there are four assets, three of which are financial and have an off-setting liability. The non-financial asset is the inventories held by firms which do not have any offsetting liability.

The rows of the upper part of the Behavioral Transactions Matrix identify all monetary transactions for each of the four sectors. The sum of these transactions is represented in the lower rows of the matrix. This result follows from the logic implied by the consistency of the model, it must be the case that the difference between a sector’s income and outlays is equal to the change in each sector’s stocks.

Table 2.1. Behavioral Transactions Matrix

	Household		Firm		Bank	Government	∑
	Workers	Capitalists	Current	Capital			
Consumption	$-C_w$	$-C_c$	$+C_s$				0
Δ in value of Inventory			$+\Delta IN$	$-\Delta IN$			0
Investment			$+I_s$	$-I_d$			0
Govt. Expenditure			$+G_s$			$-G_d$	0
[Output]			[Y]				
Wages	+WB		$-WB_f$			$-WB_g$	0
Profit		$+\Pi$	$-\Pi_f$		$-\Pi_b$		0
Depreciation Allowance			-Af	+Af			0
Interest on Time Deposits		$+r_{d-1}DD_{-1}$			$-r_{d-1}DD_{-1}$		0
Interest on Loans			$-r_{L-1}L_{-1}$		$+r_{L-1}L_{-1}$		0
Interest on Reserves					$+r_{L-1}R_{-1}$	$-r_{L-1}R_{-1}$	0
Taxes	$-T_w$	$-T_c$				$+T_d$	0
[Net Lending]	$[NL_w]$	[NLc]	0	$[NL_f]$	$[NL_b]$	$[NL_g]$	0
Change in Demand Deposits		-ΔDD			+ΔDD		0
Change in Time Deposits		-ΔTD			+ΔTD		0
Change in Loans				$+\Delta L_d$	$-\Delta L_s$		0
Change in Reserves					$-\Delta R_d$	$+\Delta R_s$	0
∑		0	0	0	0	0	0

Table 2.2. Balance Sheet

	Household		Firm	Bank	Government	
	Workers	Capitalists				∑
Demand Deposits		+DD		-DD		0
Time Deposits		+TD		-TD		0
Loans			-L	+L		0
Reserves				+R	-R	0
Inventories			+IN			+IN
Capital			+K			+K
(Net Worth)		(NW_h)	(NW_f)	0	NW_g	
∑	0	0	0	0	0	IN+K

The summing of the rows is ensured with the introduction of several equalizing equations. These equations ensure that quantity supplied is equal to quantity demanded. There are four equalizing mechanisms identified in Godley and Lavoie (2007, 63-65). The first is the

fictional Walrasian auctioneer that allows markets to continuously clear through price adjustments. The second mechanism is found in constrained equilibrium theory, which involves rigid prices, such that there is a short-side market adjustment. The third approach, which is adopted in this model, is to use inventories and is referred to as the general disequilibrium approach. This approach utilizes inventories to equate quantities supplied and demanded. The final approach is an instantaneous adjustment of production often utilized in Keynesian and Kaleckian models.

It follows that equations (1), (2), and (3) below equate the quantities supplied and demanded of consumption, investment, and government purchases of goods and services. Equation (4) states that the quantity of taxes demanded equals the quantity of taxes supplied by both subsectors of the household and assumes an effective tax collection system. Equation (5) states that the wage bill paid to working households equals the sum of wages paid to those employed in the private sector and those employed in the ELR, respectively.

The final equalizing equation states that capitalist households receive distributed profits from firms and banks.

$$C_D = C_w + C_c = C_S \tag{1}$$

$$I_D = I_S \tag{2}$$

$$G_D = G_S \tag{3}$$

$$T_D = T_S = T_w + T_c \tag{4}$$

$$WB = WB_f + WB_{elr} \tag{5}$$

$$\Pi = \Pi_f + \Pi_b \tag{6}$$

The equation for GDP and national income identity is given below. For simplicity, it is assumed that the ELR strictly produces non-market goods and services and thus its contribution to GDP on the expenditure side is measured at cost.[4]

$$GDP \equiv C_S + \mathrm{I_S} + \Delta IN + G_S + WB_{elr} \equiv WB_f + \Pi_\mathrm{f} + WB_{elr} + AF + r_{L-1}L_{-1} \qquad (7)$$

In what follows, the superscript e denotes expected and the superscript T denotes targeted; lower case variables are in real terms and upper-case variables in nominal terms.

The Real Production Decision

The decision to produce is described below. Let y be real output; s real sales; in real inventories.

$$y = s^e + in^e - in_{-1} = s^e + \Delta in^e \qquad (8)$$

Let σ^T be the desired long-run ratio of inventory to expected sales and in^T the long-run inventory target.

$$in^T = \sigma^\mathrm{T} \cdot s^e \qquad (9)$$

Let γ represent the partial adjustment between the targeted and actual level of inventory. At the end of the period, the desired inventory level that firms wish to hold is:

$$in^e = in_{-1} + \gamma(in^T - in_{-1}) \qquad (10)$$

The change in the stock of inventory is equal to the difference between production and sales.

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[4] Assuming that the ELR provides non-market goods and services is consistent with much of the literature—the ELR is not intended to compete with for-profit firms in the provision of goods and services. Rather, ELR activity should be strategically directed to activities with socially desirable outcomes. This assumption can be relaxed by assuming that the ELR sells consumption goods; the expenditure side of the GDP equation would be adjusted by replacing the ELR wage bill with the market value of the goods and services sold. The consumption decision by households would have to be adjusted to include a share of expenditures on ELR goods and services. If the share of consumption to the ELR reduces the sales of the firms, private employment would fall as would price pressures. The final aspect requiring consideration is setting the price of ELR goods and services. Given that ELR is not motivated by the pursuit of profit, the easiest method for determining price would be to set it equal to cost, which would be determined the same way it is for private sector firms. A markup to the cost could be added if so desired; this addition would generate profit for the ELR and thus inclusion of ELR profit to income side of the GDP equation. Similar reasoning would apply if the ELR sold investment goods.

$$in = in_{-1} + (y - s) \tag{11}$$

Substitution of y from (8) into (11) yields equation (11a).

$$in - in^e = s^e - s \tag{11a}$$

Equation (11a) states that the difference of realized to expected inventories is equal to the discrepancy between expected and actual sales.

Expected sales are assumed to be adaptive and are determined according to equation (12) where β is the partial adjustment parameter between actual and realized sales.

$$s^e = \beta s_{-1} + (1 - \beta) s^e_{-1} \tag{12}$$

Realized sales are equal to real consumption demanded, real investment, and real government expenditure.

$$s = c + i + g \tag{13}$$

Let $N_f, JM,$ and JD be the level of employment in the private sector, the job-matches formed, and the job-matches destroyed, respectively.

$$\Delta N_f = JM - JD \tag{14}$$

$$JM = \psi_1 \cdot \left(N^t - N_{f,-1}\right) \tag{15}$$

Job-matches are a function of the discrepancy between targeted, N^T, and actual level of employment. The partial adjustment of the discrepancy between targeted and actual employment is ψ_1 and pr is the average productivity of labor.

$$N^T = \frac{y}{pr} \tag{16}$$

The endogenously determined job-match destruction is a share of actual employment in the preceding period and the exogenous job destruction rate ψ_2.

$$JD = \psi_2 \cdot N_{f,-1} \tag{17}$$

The wage bill WB_f is equal to the level of employment N_f times the nominal wage W_f.

$$WB_f = W_f \cdot N_f \tag{18}$$

To determine the value of the stock of goods held as inventory (IN measured in nominal terms and in measured in real terms), firms rely on the unit cost of production, UC, which is a determined by the wage bill and interest (r_l) on loans (L_d) used to finance investment and inventories and private sector output.

$$UC = \frac{WB_f + r_l \cdot L_d}{y} \tag{19}$$

$$IN = in \cdot UC \tag{20}$$

Prices

Firms seek to capture a proportion, $\frac{\varphi}{1+\varphi}$, of nominal sales, S where φ represents the markup over cost. Nominal sales are defined in equation 21.

$$S = P \cdot s \tag{21}$$

Price is determined as a percentage mark-up over normal historical unit cost, $NHUC$. Recall that σ^T is the long-run desired ratio of inventories to sales. Normal cost pricing assumes the following form:

$$P = (1+\varphi)NHUC \tag{22}$$

$$NHUC = (1-\sigma^T)UC + \sigma^T(1+r_{L-1})UC_{-1} \tag{23}$$

Prices are set to ensure firms realize a profit which is given in equation 24 where AF represents the amortization funds set aside to replace depreciating capital.

$$\Pi_f = S + \Delta IN - WB_f - AF - r_{l-1} \cdot L_{-1} > 0 \tag{24}$$

Banks, Loans, and Inside Money

Banks serve two purposes: to provide the means of payments and to create the loans which finance the production of inventories and investment in capital goods. We assume banks are passive and are not constrained in creating and instantaneously providing loans demanded; as such, a description of their operations flows easily from the accounting matrices. The stock of loans outstanding derives from firms' need to finance investment and inventories.

$$L_D = L_{D,-1} + I_D - AF + (IN - IN_{-1}) \tag{25}$$

This can also be written as a difference equation.

$$\Delta L_D = I_D - AF + \Delta IN \tag{25a}$$

Banks passively supply loans demanded by firms: this simplification is equivalent to the entire firm sector possessing an open line of credit that can be drawn upon at will. However, it should be noted that this simplification ignores all forms of credit rationing related to the creditworthiness of borrowers. While this treatment of finance preserves the Keynesian "veil of money" where, according to Minsky (1992, 3), "money is connected with financing through time," it greatly diminishes the impact that the structure of financial relations has on economic performance.

$$L_S = L_D \tag{26}$$

Banks, like production firms, strive to generate a profit. The profit of banks emerges from the interest rate differential between what they charge and pay[5]. Banks charge a current interest rate, r_L, on loans, L, pay an interest rate, r_{td}, on time deposits, TD, and receive an exogenously determined interest rate, r_R, on reserves, R. In accordance with Godley (1999), albeit in simplified manner and lacking dynamics, banks are price makers for the rates charged on loans

[5] Banks also generate revenue from fees and other sources; however, these exclusions do not directly impact the outcomes studied. Given that banks distribute profits to capitalists' households, this assumption reduces the upward transfer of wealth that would result from banks charging fees to working households.

and paid on deposits, where add represents the interest rate differential banks use to set the price, but are price takers for the rates received on reserves—interest rates are administered prices. The sum of these interest payments constitutes the profit of banks, Π_b, which is assumed to be distributed entirely to the capitalist households.

$$r_l = r_r + add \tag{27}$$

$$r_{td} = r_r - add \tag{28}$$

$$\Pi_b = r_{l,-1} \cdot L_{-1} + r_{r,-1} \cdot R_{-1} - r_{TD,-1} \cdot TD_{-1} \tag{29}$$

The quantity of inside money outstanding (the sum of deposits) is equivalent to the stock of loans plus the accumulated government liability R_S. The following equation serves as the redundant equation, which is omitted from the determination of the stationary states below.

$$\Delta DD_S + \Delta TD_S = \Delta L \quad + \Delta R_S \tag{30}$$

The presentation of the banking sector is a simplification; specifically, there are more than two assets and two liabilities found on balance sheets of the banking sector, and there exists dynamics which influence the administration of prices. Including additional entries on the balance sheet of the banking sector would make the model more realistic, but it would do so at the cost of greater complexity and with no impact to the causal relationship between variables of interest. Following a similar line of reasoning, price setting dynamics by the banking sector could be further developed by endogenizing the markup banks charge over the policy rate. This extension would impact distributional outcomes and may prove interesting for future work; however, distributional outcomes lies outside the current scope of this inquiry, which focuses on how employment policy affects stability across output, employment, and prices.[6] Finally, while

[6] Distributional outcomes do impact the outcomes of output, employment, and prices; specifically, interest rate dynamics would affect financial flows and the consumption out of these flows. Endogenizing the interest rate would affect bank and firm profits, both of which are distributed to capitalists' households whose consumption is relatively

the balance sheet and behavior of the banking sector has been simplified, the most important role of this sector has been developed. The real and financial sectors are integrated consistently—loans to finance capital acquisition and to hold inventories and the deposits created by those loans are included.

Households

Households are decomposed into two classes according to the source of income: wages and profits. The working class does not own income-bearing assets and must sell their labor power for a wage; the capitalist class receives income in the form of profit originating from ownership of assets.

Workers' Income

Workers have a single source of income: the wage bill WB. As stated above in equation (5), the wage bill consists of two components: wages earned working for firms in the private sector, $WB_f = W_f \cdot N_f$, and from working in the employer of last resort, $WB_{elr} = W_{elr} \cdot (\bar{N} - N_F)$ where $\bar{N}$ is the labor force. For firms to induce a shift out of public sector employment, it must be the case that $W_{elr} < W_f$. Moreover, the level of employment in the job guarantee are members of the household sector that the firm sector has failed to employ and is equal to $\bar{N} - N$; that is, the sum of those employed in the private sector and the ELR equals the total labor force. It follows from the definition that once the ELR is operational, involuntary unemployment goes to zero. However, the question remains—how does the ELR impact the level of employment working for firms.

$$WB = W_f \cdot N_f + W_{elr} \cdot N_{elr} \tag{5}$$

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insensitive to income. Thus, any affect from this extension will be insignificant for the outcomes studied here.

The government imposes a tax liability on working households, T_w, which is equal to a fraction, θ_w, of the wage bill.

$$T_w = \theta_w \cdot \left(WB_f + WB_{elr}\right) \tag{31}$$

Where $0 < \theta_c < \theta_w < 1$.

The wage bill net of taxes constitutes workers' disposable income in nominal terms, YD_w.

$$YD_w = WB - T_w \tag{32}$$

Substitution of (31) into (32) and some simple algebra yields:

$$YD_w = (1 - \theta_w) \cdot WB \tag{32a}$$

Capitalists' Income

The capitalist class, who own assets, receive their income from two sources: the distributed profits of firms and banks Π_f and Π_b respectively, and interest on the share of accumulated wealth, V_c, held in interest-bearing time deposit accounts $r_{TD,-1} \cdot \mathrm{T}D_{-1}$.

Firms are assumed to distribute all their profits, Π_f, to capitalist households. Reproducing equation (24) from above:

$$\Pi_f = S + \Delta IN - WB_f - AF - r_{l-1} \cdot L_{-1} \tag{24}$$

Capitalist households also receive distributed profits from banks, who are assumed to distribute all their profits, Π_B. Reproducing equation (29) from above:

$$\Pi_b = r_{l,-1} \cdot L_{-1} + r_{r,-1} \cdot R_{-1} - r_{TD,-1} \cdot TD_{-1} \tag{29}$$

The final inflow for capitalist households is the interest payments, at the rate of r_{td}, received from their accumulated wealth, TD. Disposable income, YD_c, derives directly from the transaction-flow matrix.

$$YD_c = \Pi_f + \Pi_b + r_{td} \cdot TD_{-1} - T_c \tag{33}$$

The tax liability imposed on households by the Government sector is:

$$T_c = \theta_c \cdot \left(\Pi_f + \Pi_b + r_{td} \cdot TD_{-1}\right) \tag{34}$$

We assume taxes, T_c, are levied on all capitalist's household inflows at the exogenous rate θ_c, where $0 < \theta_c < \theta_w < 1$.

With the tax liability known, we can rewrite equation (33).

$$YD_c = (1-\theta) \cdot \left(\Pi_f + \Pi_b + r_{td} \cdot TD_{-1}\right) \tag{33a}$$

The difference between their disposable income, YD_c, and consumption, C_c, gives the change in capitalist households accumulated wealth.

$$\Delta V_c = YD_c - C_c \tag{35}$$

Capitalists face a decision about how to allocate their accumulated wealth. The portfolio decision confronting capitalists follows:

$$\begin{bmatrix} DD \\ TD \end{bmatrix} = \begin{bmatrix} \lambda_{10} \\ \lambda_{20} \end{bmatrix} V + \begin{bmatrix} \lambda_{11} & \lambda_{12} \\ \lambda_{21} & \lambda_{22} \end{bmatrix} \times \begin{bmatrix} 0 \\ r_{TD} \end{bmatrix} + \begin{bmatrix} \lambda_{13} \\ \lambda_{23} \end{bmatrix} YD_c \tag{36}$$

And, in accordance with Tobin (1969), the adding up constraints presented below hold.

$$\lambda_{10} + \lambda_{20} = 1 \tag{36a}$$

$$\lambda_{11} + \lambda_{21} = 0 \tag{36b}$$

$$\lambda_{12} + \lambda_{22} = 0 \tag{36c}$$

λ_{i0} for $i \in [1,2]$ represents the share of wealth desired to be held in the form of asset i. λ_{ij} for $i,j \in [1,2]$ modifies the demand for asset i based off the return asset j yields. λ_{i3} for $i \in [1,2]$ modifies the demand for asset i based off changes in disposable income.

Capitalists face a decision about how to allocate their accumulated wealth. One major shortcoming of the portfolio decision in this analysis is the lack of expectations. A more realistic treatment would introduce expectations to disposable income and wealth. Uncertainty about the actual value of income and wealth when the portfolio decision is made would require one of the

stocks (traditionally the most liquid, which in this case are demand deposits) to act as a buffer, absorbing the discrepancy between expected and actual income and wealth values. To account for the role of demand deposits as a buffer stock simply re-write the decision for the share of wealth allocated to demand deposits as presented in equation (37).

$$DD = V_c - TD \tag{37}$$

Households Real Decisions

Wage and price dynamics require households to make decision in real terms to avoid suffering from money illusion. The aggregate consumption for households in real and nominal terms respectively are stated below.

$$c = c_w + c_c \tag{38}$$

$$C = C_w + C_c \tag{39}$$

Real Decisions Workers

Households do not suffer from the money illusion when making the expenditure decision: they make their consumption decision in real terms. Thus, it is necessary to introduce the real value of workers' disposable income. The real value of disposable income for workers is:

$$yd_w = \frac{YD_w}{P} \tag{40}$$

Consumption at current prices is the product of the real consumption decision c_w and prices P.

$$C_w = c_w \cdot P \tag{41}$$

Following Kalecki (1971, 78), it is assumed that workers consume all their income: workers' marginal propensity to consume from income (α_1) is 1.

$$c_w = \alpha_1 yd_w \tag{42}$$

Real Decision Capitalists

While workers' consumption is a function of their income, capitalists' consumption decision is a function of their accumulated wealth. The real value of accumulated wealth for capitalists follows:

$$v_c = \frac{V_c}{P} \tag{43}$$

Capitalists' real consumption is a function of the marginal propensity to consume from wealth, α_2, where $\alpha_2 < 1$ and the real value of accumulated wealth.

$$c_c = \alpha_2 v_{c,-1} \tag{44}$$

The nominal consumption is the product of real consumption and prices.

$$C_c = c_c \cdot P \tag{45}$$

The Inflation Process

Prices are determined as a markup over cost and do not fluctuate to equate supply and demand. Rather, as noted by Hicks (1965, 79), the stock of inventories can serve the same role as Walrasian price mechanism in equating the quantities demanded and supplied. Without the auctioneer to set prices, the decision falls to firms. According to Lee (1998, 10), firms face two decisions when setting the price: first the firm must determine the cost, then determine the margin over the cost to set the price. Labor and capital serve as the two inputs into production; however, much like the acquisition of capital must be financed, so too must the holding of inventories. As presented earlier, the unit costs (UC) represents the cost of production and is a function of both the wage bill and the interest on loans which financed investment and inventories.

The inflation process herein is cost-push and driven primarily through wage dynamics. This treatment of inflation follows the tradition of political economy: inflation results from a conflict over the product. The private sector wage, W, is endogenously determined and is a

function of tightness of the labor market, t, as well as the policy decision concerning the minimum wage (MW).

$$t = \frac{N}{\overline{N}} \tag{46}$$

In accordance with Keynes (1964, 9), workers negotiate for a nominal wage; labor sells their capacity to perform labor for a nominal wage, which is strongly influenced by their wage aspiration, ω^T. Unlike the expenditure decision, workers do suffer from the money illusion in wage negotiations. Let Ω_0 be the autonomous component of their wage aspiration, Ω_1 the markup over the policy determined minimum wage, and Ω_2 the coefficient on labor market tightness

$$\omega^T = \Omega_0 + \Omega_1 \cdot MW + \Omega_2 \cdot t \tag{47}$$

Moreover, the policy determined minimum wage depends on whether a job guarantee is in place. Thus, we have:

$$MW = \begin{cases} \overline{MW}, & without\ ELR \\ W_{jg}, & with\ ELR \end{cases} \tag{48}$$

The nominal wage received adjusts partially, by the rate of Ω_3, to the discrepancy between what they aspire for and what they received last period.

$$W = W_{-1} + \Omega_3(\omega^T - W_{-1}) \tag{49}$$

With wage and price dynamics fully specified, we can now introduce the cost and price inflation rates, π_c and π_p, respectively.

$$\pi_c = \frac{UC - UC_{-1}}{UC_{-1}} \tag{50}$$

$$\pi_p = \frac{P - P_{-1}}{P_{-1}} \tag{51}$$

The Government

The government of the model is representative of the pure government sector and the central bank. This simplifying assumption obscures the money creation process, but it does not impact any key results. In this model, the government creates money through crediting the accounts of commercial banks at the central bank, which, for simplicity, is amalgamated with the government. High powered money, R, is a liability of the government and its creation is how the government finances all expenditures. Expenditures of the government include the purchase of goods from production firms, G_D, the respective wage bill paid to those employed in the ELR, $W_{jg} \cdot (\bar{N} - N)$, and interest paid on reserves, $r_{R-1} \cdot R_{-1}$. Government expenditure is assumed to be exogenous without an ELR and a function of the size of the ELR when it is implemented.

$$G = \begin{cases} \bar{G} & without\ ELR \\ \bar{G} + \eta \cdot (\bar{N} - N_f), & with\ ELR \end{cases}, \tag{52}$$

The government spends according to the quantity rule: it sets the nominal value of its spending and allows the market to determine the quantity as seen in equation (38) (Mitchell and Mosler 2001, 230). The interest rate is a policy decision and is set exogenously according to equation (54).

$$g = \frac{G}{P} \tag{53}$$

$$r_r = \bar{r}_r \tag{54}$$

The government only employs through the ELR. The wage bill is a function of the exogenously determined wage and the endogenously determined level of employment. The level of employment in the ELR is a residual, determined *ex-post* of the desired level of employment in the production firm sector. The ELR is in no manner restricted by sales, taxes, or the profit motive; the primary function of the ELR is to employ those who the private sector has failed to employ. The exogenous determination of the wage is an important feature for price stability; it

remains imperative that the ELR wage does not chase the private sector wage up, as that may create an inflationary wage-price spiral. According to Mitchell and Mosler (2001, 230) the exogenous determination of the wage is referred to as spending on the price rule: the government sets the price of labor and lets the market determined the level of spending.

$$WB_{elr} = W_{elr} \cdot \left(\overline{N} - N_f\right) = W_{elr} \cdot N_{elr} \tag{55}$$

Tax revenues, T, is the only channel available for extinguishing the government's liability. Tax revenue is a function of the exogenously determined tax rates, θ_w and θ_c, and the income of households. In regard to the tax rates, the following holds: $0 < \theta_c < \theta_w < 1$. Total tax revenue is derived from three previous equations: (4), (31), and (34).

$$T = \theta_w \cdot \left(WB_f + WB_{elr}\right) + \theta_c \cdot \left(\Pi_f + \Pi_b + r_{td} \cdot TD_{-1}\right) \tag{56}$$

With the government's inlays and outlays fully specified, we can now derive the change in the stock of reserves issued to fund expenditures and which are held exclusively by banks. Equation (41) states that the stock of liabilities issued by the federal government is equal to the difference between its outlays and inlays.

$$\Delta R_s = G + WB_{elr} + r_r \cdot R_{-1} - T \tag{57}$$

This is a simplified representation of the public sector as many aspects are ignored; specifically, there are no transfers of any kind from the public sector, and taxes are only levied on income. Since the only inlay of the government is endogenously determined, it follows that the total fiscal stance of the government, determined by the difference between inlays and outlays, will be endogenously determined. We can further illustrate this by considering an income approach to GDP like that presented by Kalecki (1971). Let price be given by, P, and quantity by Q. Direct from the accounting matrices we have:

$$PQ \equiv C + I + \Delta IN + G \equiv W_f N_f + r_L \cdot L + \Pi_f + AF \tag{58}$$

From here, add the wage bill from the ELR (WB_{elr}), interest paid on reserves ($r_{r,-1} \cdot R_{-1}$), and interest paid on time deposits ($r_{td,-1} \cdot TD_{-1}$) and subtract consumption (C), investment (I), change in inventories (ΔIN), interest paid on reserves ($r_{r,-1} \cdot R_{-1}$), and taxes (T). From here, simple algebra yields a very important conclusion. Recall from equations (29), (32), (33), (35), (57), and (25a) that:

$$\Pi_b = r_l \cdot L_{-1} + r_r \cdot R_{-1} - r_{td} \cdot TD_{-1} \tag{29}$$

$$YD = YD_w + YD_c = (WB_f + WB_{elr} - T_w) + (\Pi_b + \Pi_f + r_d \cdot TD_{-1} - T_c) \qquad (32) + (33)$$

$$YD_c - C_c = \Delta DD + \Delta TD = \Delta V \tag{35}$$

$$\Delta R_s = G + WB_{elr} + r_r \cdot R_{-1} - T \tag{57}$$

$$\Delta IN + I_d - AF = \Delta L \tag{25a}$$

With the appropriate substitutions we end up with the following result.

$$\Delta R \equiv \Delta V - \Delta L \tag{59}$$

Most importantly, it becomes clear that the change in high-powered money which results from a change in the public sectors inlays and outlays equals the change in the net worth of the private sector. This is a well-known macroeconomic identity that applies regardless of the theoretical framework and traditionally takes the following form: $(S - I) \equiv (G - T)$. Stated explicitly, in a closed economy, the net saving of the private sector must be equal to the government deficit. The principal implication is that if the private sector desires to accumulate savings, the government must deficit spend. If the government does not adjust its spending to match the desired level of saving in the private sector, then income will adjust through a decline in profit and employment.

The primary implication just discussed links nicely to Lerner's Functional Finance. In his 1943 article "Functional Finance and the Federal Debt," Lerner states, "the first financial

responsibility of the government (since nobody else can undertake that responsibility) is to keep the total rate of spending in the country on goods and services neither greater nor less than that rate which at the current prices would buy all the goods that it is possible to produce. If total spending is allowed to go above this, there will be inflation, and if it is allowed to go below this there will be unemployment" (39).

Simulating the Model

The model is simulated using the PK-SFC package in R. However, before simulations can be run, values for parameters and initial endogenous variables must be determined. There are two possible methods for determining values: econometric estimation and calibration. The benefits and drawbacks of both methods are explored by Caverzasi and Godin (2014). Following the most common approach by Post-Keynesian scholars, this analysis relies on the methodology of calibration to determine parameter and initial endogenous variable values. To overcome the arbitrary nature of this methodology, a sensitivity analysis was performed. A future opportunity for development emerges from the method used to check for robustness; Ciuffio and Rosenbaum (2015) suggest using Monte Carlo simulations to examine combinations of parameter and starting values to analyze the impact that calibration has for stability and in producing economically meaningful results.

The first step in running the simulations is to solve for the stationary states. In a steady state, both flows and stocks remain in constant relationship with each other. Stationary states are steady states without growth; that is, the level of the stocks remain constant, as the inflows are equal to the outflows. The constancy of the stationary states allows us to ignore time subscripts. Furthermore, the stationary states enable the discussion of long-run solutions (Godley and Lavoie 2007, 71); these solutions are important because once the long-run solutions are found,

external shocks can be added, and implications can be identified. Allowing the software to solve for the stationary states, in the long run equilibrium (stock equilibriums denoted by *) we have the following results:

$$\Delta R^* = 0 \tag{60}$$

$$\Delta IN^* + I_d - AF = \Delta L^* = 0 \tag{61}$$

$$\Delta DD^* + \Delta TD^* = \Delta V^* = 0 \tag{62}$$

$$\Delta N^* = 0 \tag{63}$$

There is a total of three simulations that are considered in this analysis. The first simulation considers output, employment, and price dynamics that result from introducing an ELR. In this simulation, two scenarios are treated and differ according to how high the ELR wage is set. In the final two simulations, the ELR wage is set at the lower value from the first simulation. This first simulation also provides us with the baseline solutions from which the analysis compares the changes in key outcomes that result from the addition of shocks to the model's parameters and exogenous variables. The first of these final two simulations involves a shock to the markup that firms use to set the price above their cost. The final simulation introduces a negative shock to the autonomous component of government expenditure.

Simulation 1: Introducing the ELR

The first simulation introduces the ELR into a hypothetical economy without guaranteed employment. This is achieved by solving for the stationary state with the ELR wage set to zero and then adding an external shock, increasing the ELR wage. The first simulation involves two scenarios. The first scenario sets the ELR wage significantly higher than the minimum wage, while the second scenario sets the ELR wage equal to the minimum wage. Figure 2.3 demonstrates the dynamics of output, prices, and employment that result from introducing the

ELR. Introducing the ELR causes a temporary increase in the rate of inflation. The increased inflation results from increased cost of production, particularly through higher wage demands. For firms to motivate workers to exercise their capacity to perform labor, they must pay a wage that is greater than what they would receive in the ELR. To induce a shift from the ELR to the private sector, firms must pay a premium over the ELR wage, which effectively becomes the reservation option. The second channel through which the ELR induces a temporary rise in inflation is also evident in Figure 2.3. Providing a wage to the unemployed increases aggregate demand, which drives private sector employment and output higher. The wage aspiration of labor is a positive function of labor market tightness. As employment levels rise, so too does the wage, and thus prices, which are determined as a markup over cost, also increase. However, this inflation erodes the real purchasing power of households, which reduces aggregate demand and ultimately causes private sector employment and output to drop approximately three per cent lower than its pre-ELR value.

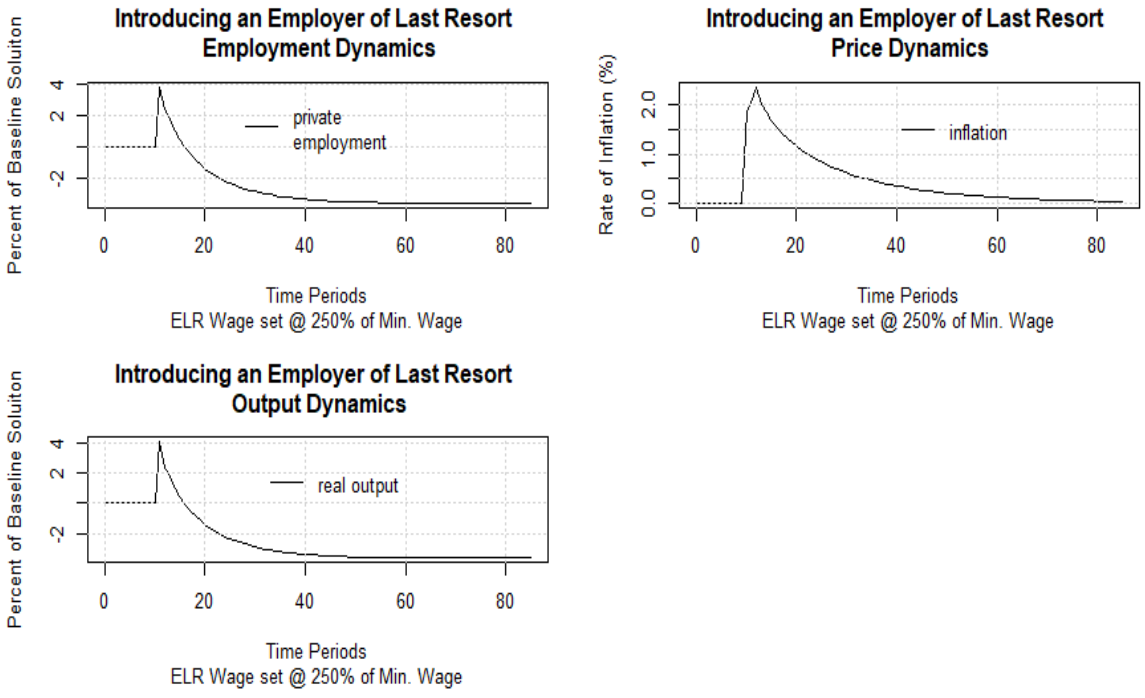

Figure 2.3. Introducing ELR with higher wage: Output, employment, and prices

In scenario 2, when the ELR wage is set equal to the previously determined minimum wage, introducing the ELR causes a positive impact to private sector employment and output (see Figure 2.4) as it settles at approximately 103% of its pre-ELR value. The difference in these two scenarios results primarliy from the impact on the costs of production. As evidenced when comparing Figure 2.3 and Figure 2.4, the impact on prices when the ELR wage is set lower is much smaller than the impact when the ELR wage was higher. Interestingly, the introduction of the ELR with a low wage actually causes a temporary drop in prices. This results from the frictions in the job-matching process. Given these frictions, firms increse the exploitation of labor in the face of an unexpected increase in demand, which reduces the unit costs until the firm is able to hire more labor power. The relatively modest impact to prices does not erode the purchasing power of households and thus results in greater impact to the private sector employment. This drop in prices could be moderated thorugh transparent policy making.

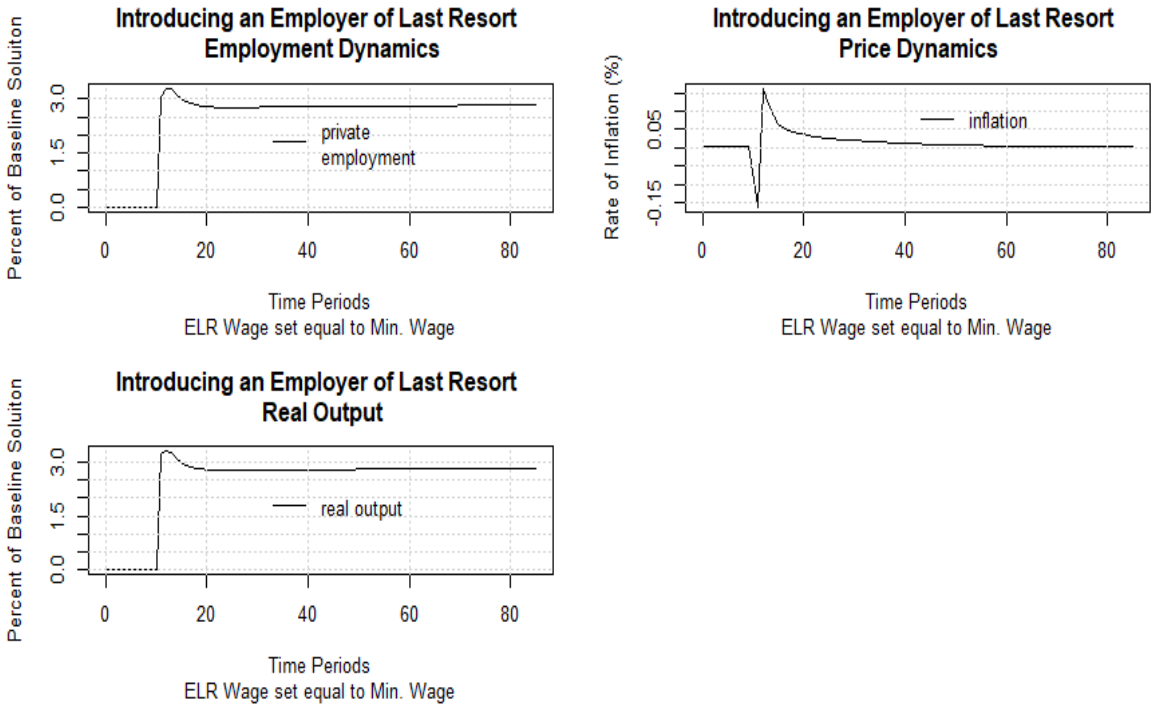

Figure 2.4. Introducing ELR with lower wage: Output, employment, and prices

Simulation 2: Increasing the Markup

The second simulation adds a positive shock to the size of the markup, which causes an increase in the price, *ceteris paribus*. In this simulation, an unrealistic increase of 60% to the markup is assumed. However, what matters is not the absolute changes, but how does the modeled economy with an ELR compare to the model of the economy without an ELR. Figure 2.5 demonstrates the impact to private sector employment from increasing the markup. The observed dynamics result from inflation eroding the purchasing power of the household, reducing aggregate demand, and thus diminishing the level of employment in the private sector. The decrease in aggregate demand is further exacerbated by the ensuing reduction in employment and wage bill. However, as the labor market slackens, wage demands decrease, which alleviates the pressure on prices. The introduction of the ELR provides an additional dampening mechanism—by providing a source of income to households who are displaced from

private sector employment, consumption expenditure and thus aggregate demand and employment are maintained. This additional dampening mechanism, represented as an additional negative feedback loop, is demonstrated in Figure 2.6; as private employment falls, the wage bill in the ELR rises which sustains real disposable income.

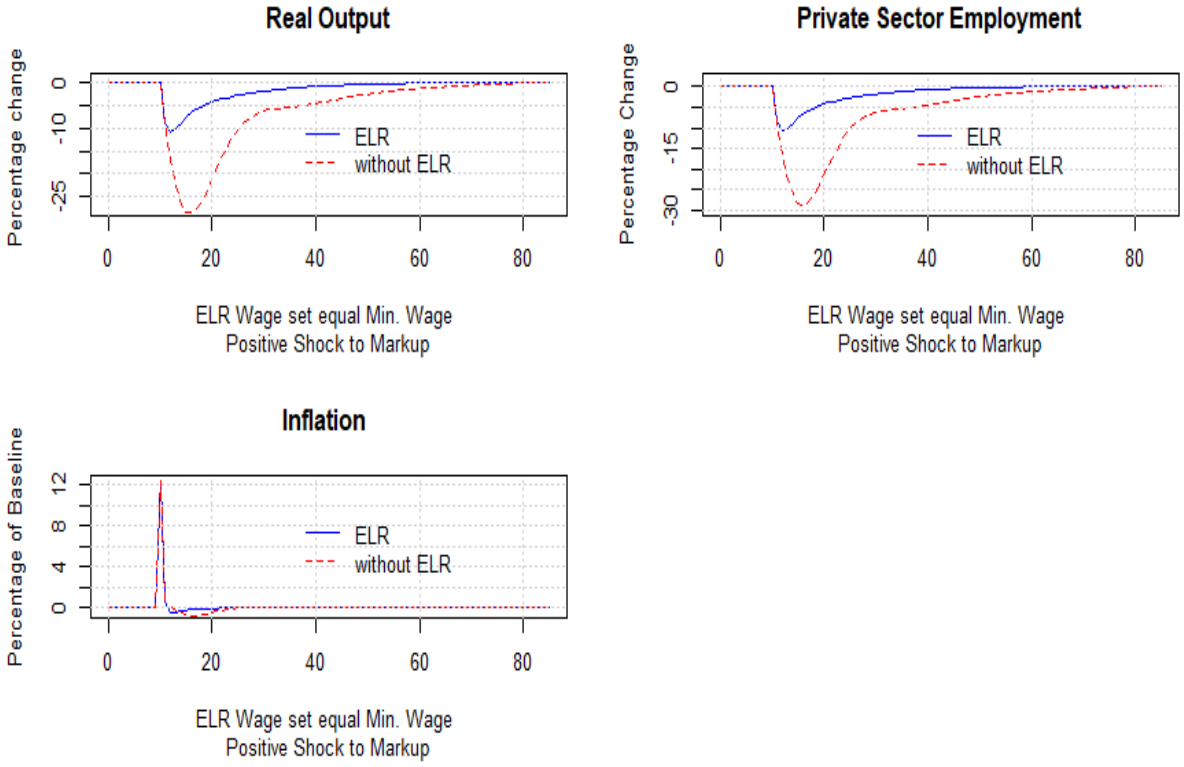

Figure 2.5. Positive shock to markup: Output, employment, and prices

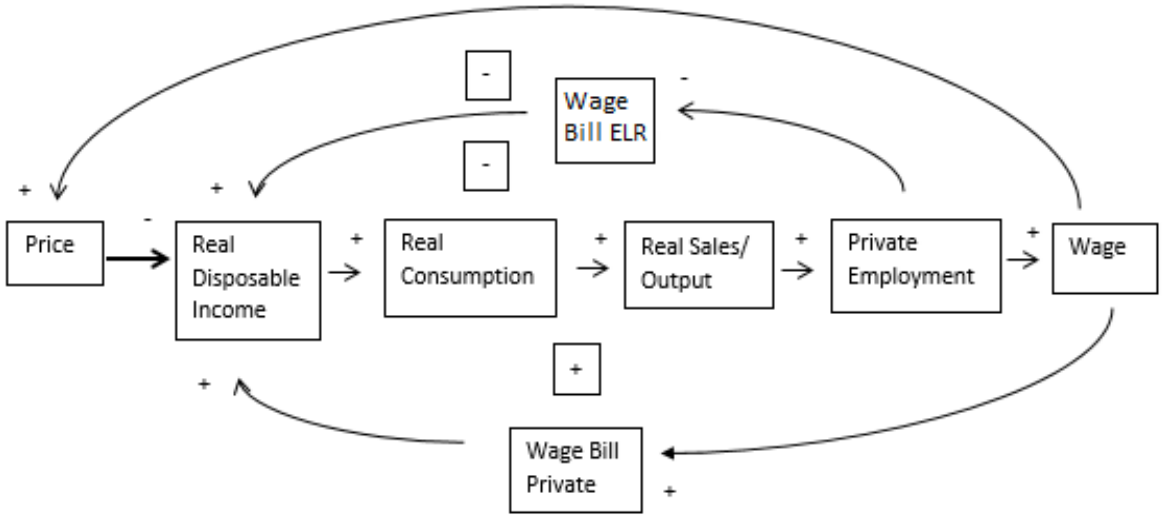

Figure 2.6. Causal loop diagram: How ELR stabilizes output, employment, and prices

Figure 2.7 demonstrates the distributional implications that result from increasing the markup: profits rise dramatically, and wages decline slightly. The resulting inflation erodes purchasing power and reduces consumption and thus employment; as employment falls, labors bargaining position weakens and the wage declines. The effect on output and employment is reduced as firm profits, which rise dramatically, are paid to capitalist households, which reduces inflation's overall impact on total consumption. The wage in the economy without the ELR undergoes a nearly four times greater drop than the decline in the economy with the ELR. The ELR keeps the private sector wage higher by sustaining aggregate demand and reducing slack in the labor market that would drive the wage down. This result is shown in Figure 2.5, where real output in the economy without the ELR declines by approximately three times the decline in the economy with the ELR. Similarly, by sustaining demand in the face of falling private sector employment, profits in the ELR economy exceed those of the non-ELR economy.

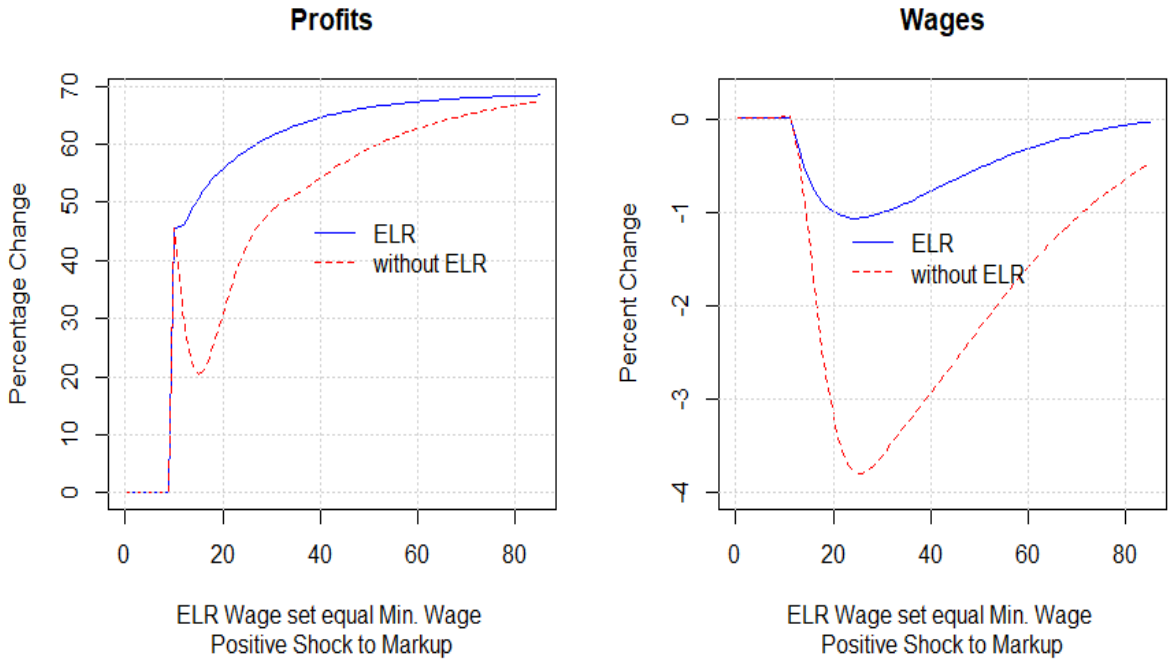

Figure 2.7. Positive shock to markup: Nominal incomes

Simulation 3: Decreasing Government Expenditure

The final simulation, presented in Figure 2.8, decreases the autonomous component of government expenditure by 25%. The modeled economy with the ELR does not experience nearly as significant of a drop in both employment and output as the economy without the ELR. The workers who are displaced from the initial shock, without guaranteed employment, sit idly by with no source of income and hence means to sustain consumption, which causes the level of employment to contract by approximately 20%. The economy with the ELR had employment contract by only 5%. The economy with the ELR also has prices stabilize much more quickly than the modeled economy without the ELR.

Figure 2.8. Negative shock to government expenditure: Output, employment and prices

Discussion of Price Dynamics

The introduction of an ELR, according to Mitchell (1998, 552-553), enables the economy to function at "loose full employment" while simultaneously maintaining price stability. Loose full employment refers to a recognition that slack in the labor market would continue even at full employment. However, the slack would no longer exist in the form of unemployment; rather, the slack exists in the form of a pool of labor power (the ELR labor force) that the private sector can hire from whenever desired. This pool of labor power allows the private sector to expand production with an increase in demand, even with the economy operating at full employment.

Additional price stability mechanisms identified in the literature include the exogenous price setting of labor and the ELR's ability to act like buffer stock programs for commodities. The government sets the ELR wage and purchases all unwanted labor power or relinquishes all

labor power demanded by the private sector. The exogenously fixed wage acts as the *numeraire* or price anchor for labor employed outside of the ELR and remains independent of labor market conditions. Specifically, the set price for labor exists as a floor and does not chase wages upward (Minsky 1973, 99-100; Mitchell and Wray 2005, 237-238). The fixed nature of the ELR wage creates a stabilizing influence on all other wages as it provides a stable base price for the determination of other wages. Setting the ELR wage above the existing minimum wage, holding the markup constant, would cause an increase in prices; moreover, as seen in Figures 2.3 and 2.4, the resulting inflation erodes purchasing power and diminishes the ELR's impact on output and employment.

According to Wray (1998, 174), the exogenous nature of the ELR wage would enable the government to stabilize the price of labor and to "impart greater price stability across the spectrum of prices of goods and services." As demonstrated in the first simulation (Figures 2.3 and 2.4), setting the ELR wage has significant implications for the behavior of prices. The second simulation (see Figure 2.5) reinforces the claim made by Wray—the economy without the ELR experienced a larger variation in the movement of wages (a cost of production) and thus in prices (determined as a mark-up over costs) than the economy with the ELR.

The next aspect of price stability is the ELR's inherent counter-inflationary features. These features remain one of the most contested aspects of the public employment strategy. The analysis first considers the opponents' claims regarding the posited inflationary forces that would ensue with the implementation of an ELR. The critics' inflationary argument remains best understood by breaking it down into two categories: cost-push because of either wage-to-wage pressures or a wage/price spiral and demand-pull as a result of increasing aggregate demand. Opponents, most notably Malcom Sawyer (2003, 904), claim that an ELR would reduce the fear

of being fired, which would increase shirking and result in higher wage demands, thus producing cost-push inflation.

At the level of aggregation in this model, it is not possible to consider individual motivation and the resulting behavior. However, the literature suggests that an ELR would actually be more effective in disciplining labor: ELR workers demonstrate their willingness and ability to work, while private employers can hire from the pool at a slight markup over the ELR wage (Mitchell and Wray 2005, 236; Wray 1998, 131). The argument has been made that ELR workers pose a significant threat to those already employed in the private sector; Mathew Forstater (1999, 17) states that the pool of labor power employed in the ELR serves the same role as the reserve army of unemployed. Beyond the discipline factor, the implementation of an ELR, according to Forstater (1999, 14), allows workers to maintain a higher skill level, thus reducing the cost of hiring out of the ELR as opposed to hiring from the unemployed. Finally, considering that the ELR wage is exogenously set and accepts all who are willing and able to work without seeking certain employment levels or skills, it serves as a wage floor and does not exert any upward pressure on wages beyond the initial wage setting (Mitchell and Wray 2005, 238).

The second argument by opponents draws on a belief that an ELR raises employment by increasing aggregate demand. According to this interpretation, an ELR would push employment levels below supply side inflation barriers, like the NAIRU (non-accelerating inflation rate of unemployment), and result in inflation. However, this belief fails to recognize the difference in targeted spending and pump priming (lowering taxes or increasing government spending). An ELR allows the economy, as mentioned previously, to operate at loose full employment: full employment regardless of the level of aggregate demand. Given that an ELR operates independently of aggregate demand, Mitchell and Wray (2005, 236-238) conclude that policy

makers maintain an ability to influence aggregate demand through traditional fiscal and monetary policy measures without affecting the employment level. The first simulation (Figures 2.3 and 2.4) verifies parts of the opponents' claim. Introducing the ELR does indeed increase aggregate demand and generate additional inflationary pressures. The increase to aggregate demand results from providing income to those previously excluded from the provisioning process. The simulations suggest that if the ELR wage is not set significantly higher than the prevailing wage, the impact to prices is minimal and transitory. The modest impact on prices allows the ELR to have a greater impact on the level of private sector employment; when the ELR approximates the prevailing wage, the increased income to households is not eroded via higher inflation and thus facilitates greater demand and higher output and private employment. Excess capacity serves as a key characteristic of advanced capitalist economies (see Figure 2.9, which graphs Total Capacity Utilization rates for the U.S.). Given the excess capacity, the model yields results in accordance with Mitchell and Mosler (2001, 223) who state that "firms are likely to increase capacity utilization to meet the higher sales volume."

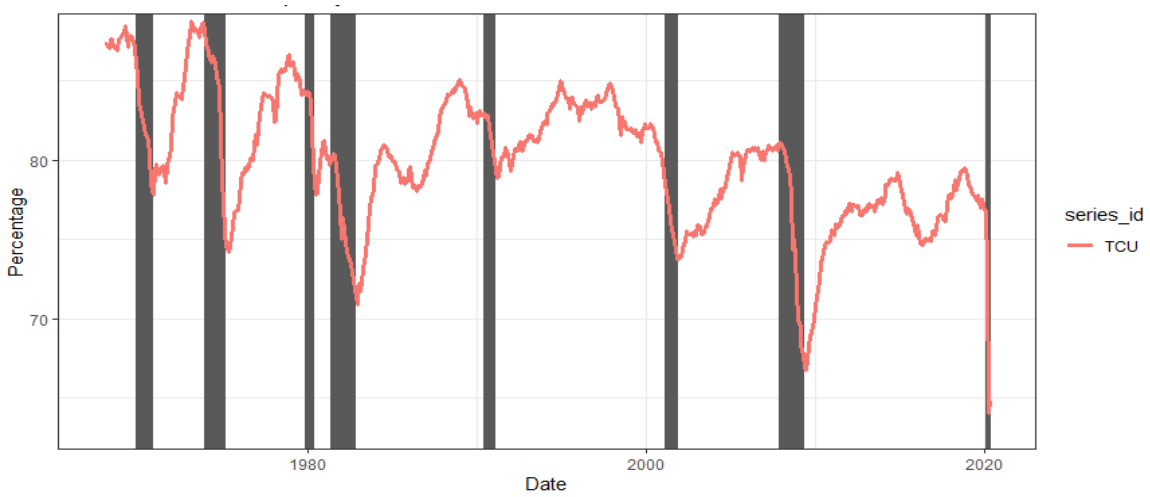

Figure 2.9. Evolution of Total Capacity Utilization
Source: Board of Governors of the Federal Reserve System (U.S.)

The ELR achieves full employment independent of the level aggregate demand by utilizing a concept termed "spending on the price rule" (Mitchell and Mosler 2001, 230); this concept grants policy makers the freedom to set the price of labor and let the market determine the level of spending. Spending on the price rule contradicts the current approach, termed "spending on the quantity rule" (Mitchell and Mosler 2001, 230); the quantity rule dictates that policy makers set the amount to be spent and let market processes determine the price. Contractionary policy, if deemed desirable by policy makers, under the public employment strategy would simply cause a shift from non-ELR employment to ELR employment. Contractionary policy was the focus on the third simulation (see Figure 2.8). Contractionary fiscal policy does indeed induce a shift from private sector employment to the ELR; however, the level of employment in the private sector is much more stable with the ELR—not only does the ELR impart additional price stability, it also provides a stabilizing influence on output and employment. The increased stability across prices, output, and employment results from the negative correlation that exists between the size of the ELR and private economic activity. The causal loop diagram in Figure 2.7 demonstrates the nature of this relationship: as firms release labor, the ranks of the ELR swell, which causes the total ELR wage bill to increase. The reduction in demand through household consumption expenditure via lost wages from private employment is partially offset by the income received from public employment.

Discussion of Labor Market Flows

Insufficient demand, in accordance with Keynes (1964) and reasserted by A.P. Thirlwall (1993, 335), remains the primary cause of unemployment. Unemployment is a macroeconomic problem; however, J.E. King (2015, 4) acknowledges that unemployment does entail a microeconomic dimension. These microeconomic dimensions are observed empirically as labor

market flows. Specifically, heterogeneities within the labor market animate a search and match process which is timely, responsible for generating labor market flows significantly larger than those initiated by desired changes in firm employment levels, and generates worker flows which are disproportionately concentrated within a subset of the labor force.

Contrary to the approach traditionally adopted in SFC models (Godin 2014; Godley and Lavoie 2007), employees, employers, and jobs are heterogeneous. Davis and Haltiwanger (1992) and Davis, Schuh, and Haltiwanger (1997) find empirical evidence supporting heterogeneous employment dynamics at the plant-level. The success of these authors' approach spawned a literature which substantiated and encouraged further development of the equilibrium approach to unemployment as described by Dale Mortensen and Christopher Pissarides (1999) and which is presented in a very pedagogical manner in Pissarides (2000). This analysis incorporated insights from the job flow approach to modelling the labor market in utilizing a matching function. The matching function describes job-match formations as a function of both micro and macro elements. Introducing a matching function allows the analysis to capture the implications of labor market heterogeneities responsible for search and match frictions without, according to Pissarides (2000, 4), explicitly modeling the features which give rise to it. The churning flows are modelled by an additional flow out of employment that is independent of desired firm level employment and is pro-cyclical (Akerlof, Yellen, and Rose 1988, 495).

This analysis has explicitly accounted for the labor market flows representing the significant and regular occurrence of separations and accessions of employee-employer job-matches. This analysis suggests the importance of modelling the microeconomic dimensions of unemployment in facilitating a more effective ELR policy proposal as well as a more comprehensive understanding of its effect on key economic outcomes. Labor is heterogeneous

and viscous, assuming these frictions away downplay benefits afforded by the ELR. The analysis has sought to demonstrate that accounting for and modelling the sheer size of the labor market flows contains implications on labor market outcomes. Including these labor market flows into the model further demonstrates the increased stability and higher private employment levels that results from the ELR.

As evidenced in Chapter 1, approximately 17% of all job-matches are dissolved every quarter and 70% of those dissolutions are due to heterogeneities in the labor market. This large flow of workers into the pool of unemployed labor power acts as a drag on aggregate demand; however, transitioning into the ELR, as opposed to the incomeless despair of unemployment, reduces the loss of income and provides a stabilizing influence on output, employment, and prices. The analysis understates the benefits as they relate to the observed heterogeneity. The ELR, according to Mitchell and Wray (2005, 238), serves as a stock of labor power from which the private sector can draw from when it wishes to expand. The stock of labor is kept active, either working or engaged in an assisted search, preventing deterioration of skills and offering a work history which reduces costs associated with search and match; ultimately, it is conceivable the ELR should facilitate a more effective search and match process.

Future Developments

The SFC model presented above incorporates the labor market heterogeneity that drives job and worker flows, a novel contribution to the SFC modelling and ELR literature. Integrating these flows promotes a greater understanding of how the ELR will influence key economic outcomes. However, a key feature of these flows is ignored—these labor market flows are concentrated among a subset of the population and drive the existence of a segmented labor market. Ignoring the concentration of these flows downplays some of the distributional benefits

afforded by an ELR. Moreover, the only constraint to the supply process are the labor market heterogeneities just discussed. Capital and the investment which leads to its production is not featured as prominently as it is in the capitalist economic system in which we live. In the following section, the shortcomings of this model are considered and future developments are discussed.

Segmented Labor Market

In addition to modeling the heterogeneity of employees, employers, and jobs, the labor market can be divided into primary and secondary markets to better account for segmentation (Lavoie [2014] 2015, 277). Peter Doeringer and Michael Piore ([1971] 1985) and Michael Reich, David Gordon, and Richard Edwards (1973) developed this theory, which posits that there exists a primary market defined by stable jobs and higher wages and a secondary market with unstable jobs and lower wages. More recent empirical work by Burgess, Lane, and Stevens (2000, 484), Anderson and Meyer (1994, 179), and Chapter 1 of this dissertation lend credence to the claim that a segmented labor market does indeed exist. These empirical studies find evidence that there exists a subgroup of the labor force which faces a more precarious labor market experience defined by frequent turnover. In seeking to account for the segmented labor market, the household sector needs to be decomposed into those who participate in the primary or the secondary markets. This decomposition will facilitate a better understanding on the distributional implications prompted by an ELR.

However, the empirical studies on labor market flows, like the one in this dissertation, utilizes a dataset which offers no insight into those participating in the informal sector. According to a study by Daniel Flaming, Brent Haydamack, and Pascale Joassart-Marcelli (2005, 1-4) approximately 15% of Los Angeles county's labor force participates in the informal

economy; this sector is unregulated and often characterized by a disregard for basic rights of workers. While LA County is somewhat unique given its proximity to the Mexico-U.S. border, ignoring the informal sector causes this analysis to underestimate the size of the marginalized labor force that would be positively impacted with the implementation of an ELR. This shortcoming can be addressed by varying the relative size of the secondary market and measuring the sensitivity of these results.

Investment

Minsky (2008) describes a capitalist economy as a dynamic system driven by the pursuit of profit. The profit motive restricts the economic decisions of private enterprise. Kalecki's (1971) profit equation elucidates the importance of investment in determining profit and hence the scope of its influence on economic activity. The recognition regarding the significance of investment was not restricted to academia; indeed, the stimulation of private investment has resided at the core of policymakers' approach to generating employment for at least several decades. Moreover, the undertaking of investment generates residues which influence future economic activity.

Under the current institutional structure, investment links the present and the future. This link appears as transfer of money across time: present money, required for the development of capital goods, is exchanged for the future cash flows that the capital goods is expected to generate. Utilizing finance to fund the capital development leads to the creation of a claim against the future cash flows, linking the balance sheets of different sectors. Moreover, investment leads to the production of long-lived capital goods which take time to produce. As such, positive net investment increases the size of the capital stock.

The current treatment of investment downplays its influence on the level of economic activity and diminishes the unique ability of an ELR to generate full employment independent of the profit constraint. The unique ability to circumvent the profit constraint facilitates an exploitation of the capital saturation described by Foster and McChesney (2009) in a socially beneficial manner. In so doing, the analysis considers the relations between investment, the stock of capital, the concomitant relations of each upon economic performance (including the level of employment in the private sector), and how full employment generated with the implementation of a ELR remains robust to a convincing treatment investment.

Forstater's (1999) brief, "Public Employment and Economic Flexibility," states that economic flexibility, a highly touted characteristic of private enterprise market economies, is traditionally achieved through the existence of excess capacity and unemployed resources. This flexibility enables the economy to accommodate unexpected increases in aggregate demand without spurring inflation. In the private investment employment strategy, according to Minsky (1973), private investment serves as a chief determinant of the level of economic activity and is constrained by the profit motive of private enterprise. Compounding this constraint upon economic activity, Foster and McChesney (2009) state that the U.S economy has reached the mature capitalist stage. This stage of development is characterized by capital saturation, which contributes to lower than optimal levels of economic activity. Excess capacity reduces the profit from investing, in turn reducing investment. The reduction in investment depresses overall economic activity and contributes to unemployment.

As Mitchell and Muysken (2008, 164, 201) stated, "the best attack on unemployment is to increase employment." However, employment in the private sector depends on investment, which in turn depends on profit. This profit constraint, which has been exacerbated by capital

saturation, prevents the economy from achieving full employment. The decision of “to employ or not to employ” in the private sector is wholly dependent on the criterion of expected profitability (Forstater, 1999). The government exists as the only entity that can provide an infinitely elastic demand for labor that functions independently of the profit constraint. Ultimately, the decision to employ or not to employ, when made by the government, can and should incorporate a broader set of criteria. A broader set of criteria defining the employment decision would enable the government to direct economic activity to sectors of the economy that are suffering from capital saturation and away from areas with insufficient supply. It is possible to circumvent the profit constraint and arrive at full employment while maintaining economic flexibility with the public employment strategy.