# Credit Subsidy rel. Pareto weight 1

December 22, 2017

### 1 Tables with Results

	No cred sub	Optimal policy	Optimal SS cred sub	Optimal Flat cred sul
$\overline{\varsigma_0}$	0.00000	1.00000	0.25789	-0.07778
$\bar{\zeta}$	0.00000	-0.76401	0.25789	-0.07778
Half life	-	16.00000	-	-
Welfare (weighted)	-10.29030	-9.74609	-10.51029	-10.28139
Welfare workers	-5.86691	-5.89540	-6.82162	-5.68462
Welfare entrepreneurs	-19.13708	-17.44748	-17.88763	-19.47493

	Constant $\varsigma_0$	Constant $\bar{\zeta}$
<u> </u>	1.00000	-0.76401
$\overline{\varsigma}$	1.00000	-0.76401
Half life	_	_
Welfare (weighted)	-29.36320	-10.69217
Welfare workers	-37.98524	-5.07960
Welfare entrepreneurs	-12.11912	-21.91733

Experiment	Total welfare	Worker welfare	Entrepreneur welfare
Optimal policy	0.01902	-0.00085	0.08815
Optimal flat cred sub	0.00031	0.00548	-0.01675
Constant $\varsigma_0$	-0.50953	-0.65105	0.42034
Constant $\bar{\zeta}$	-0.01381	0.02390	-0.12978

#### 2 Parameters and functional forms

#### 2.1 Functional forms etc.

- Occupational choice: No
- Workers save: No
- Decreasing returns to scale: Yes
- Productivity process: Ornstein-Uhlenbeck,  $d \log(z) = -\nu \log(z) dt + \sigma dW$
- Period utility function:

$$u(c,l) = (1-\gamma)^{-1}c^{1-\gamma} - \nu(l), \quad \nu(l) = (1+1/\chi)^{-1}l^{1+1/\chi}$$

- Production function:  $y = F(z, k, n) = zA((k f_k)^+)^{\alpha}((n f_n)^+)^{\beta}$
- Credit subsidy schedule:  $\varsigma_k(t) = \bar{\varsigma}_k + e^{-\gamma t}(\varsigma_{k,0} \bar{\varsigma}_k)$

### 2.2 Parameter values

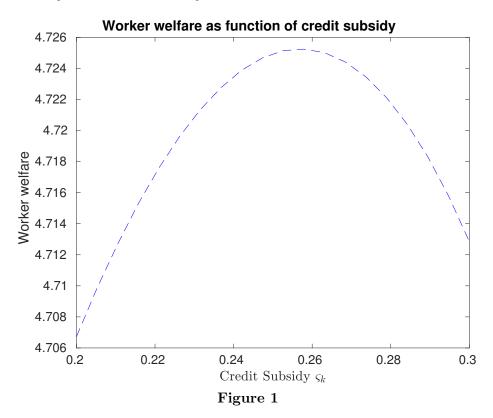
Pareto weight workers0.667Population share of workerspopshare0.667Total populationpopmass1.000Discount rate entrepreneurs $\rho_e$ 0.050Discount rate workers $\rho_w$ 0.030Relative risk aversion $\gamma$ 1.000Inverse Frisch elasticity $\varphi$ 1.000Depreciation rate $\delta$ 0.000Fixed cost capital $f_k$ 0.000Fixed cost labor $f_n$ 0.000Financial constraint parameter $\lambda$ 2.000Common TFP parameter $A$ 1.000Capital share $\alpha$ 0.297Labor share $\alpha$ 0.297Interest rate $\alpha$ 0.900Interest rate $\alpha$ 0.900Productivity drift parameter $\nu$ 0.163Productivity drift parameter $\nu$ 0.163Productivity standard deviation parameter $\sigma$ 0.850Productivity mean $\bar{x}$ 1.148Poisson arrival rate0.100Parameter of Pareto distribution of Poisson shocks1.100Contraction of initial distribution $\chi$ 0.100			
Total populationpopmass1.000Discount rate entrepreneurs $\rho_e$ 0.050Discount rate workers $\rho_w$ 0.030Relative risk aversion $\gamma$ 1.000Inverse Frisch elasticity $\varphi$ 1.000Depreciation rate $\delta$ 0.000Death rate $\theta$ 0.000Fixed cost capital $f_k$ 0.000Fixed cost labor $f_n$ 0.000Financial constraint parameter $\lambda$ 2.000Common TFP parameter $A$ 1.000Capital share $\alpha$ 0.297Labor share $\beta$ 0.603Returns to scale $\alpha + \beta$ 0.900Interest rate $r^*$ 0.300Effect of productivity on effective labor supply $\eta$ 0.000Productivity drift parameter $\nu$ 0.163Productivity yearly autocorrelation $e^{-\nu}$ 0.850Productivity standard deviation parameter $\sigma$ 0.300Productivity mean $\bar{z}$ 1.148Poisson arrival rate0.100Parameter of Pareto distribution of Poisson shocks1.100	Pareto weight workers		0.667
Discount rate entrepreneurs  Discount rate workers $\rho_e$ 0.030  Relative risk aversion  Inverse Frisch elasticity  Depreciation rate $\delta$ 0.000  Depreciation rate $\delta$ 0.000  Fixed cost capital  Fixed cost labor  Financial constraint parameter $\delta$ 0.000  Capital share $\delta$ 0.200  Capital share $\delta$ 0.603  Returns to scale  Interest rate $\delta$ 0.900  Interest rate $\delta$ 0.900  Productivity drift parameter $\delta$ 0.900  Productivity standard deviation parameter $\delta$ 0.300  Productivity mean  Parameter of Pareto distribution of Poisson shocks $\delta$ 0.030  Capital share $\delta$ 0.050 $\delta$ 0.000 $\delta$ 0.000 $\delta$ 0.000 $\delta$ 0.000  Productivity standard deviation of Poisson shocks $\delta$ 0.0100 $\delta$ 0.000 $\delta$ 0.000  Parameter of Pareto distribution of Poisson shocks $\delta$ 0.100	Population share of workers	popshare	0.667
Discount rate workers $\rho_w$ 0.030 Relative risk aversion $\gamma$ 1.000 Inverse Frisch elasticity $\varphi$ 1.000 Depreciation rate $\delta$ 0.000 Death rate $\theta$ 0.000 Fixed cost capital $f_k$ 0.000 Fixed cost labor $f_n$ 0.000 Financial constraint parameter $\lambda$ 2.000 Common TFP parameter $\lambda$ 1.000 Capital share $\lambda$ 0.297 Labor share $\lambda$ 0.603 Returns to scale $\lambda$ 0.900 Interest rate $\lambda$ 0.900 Interest rate $\lambda$ 0.900 Productivity drift parameter $\lambda$ 0.300 Productivity standard deviation parameter $\lambda$ 0.300 Productivity mean $\lambda$ 1.148 Poisson arrival rate Parameter of Pareto distribution of Poisson shocks	Total population	popmass	1.000
Relative risk aversion $\gamma$ 1.000Inverse Frisch elasticity $\varphi$ 1.000Depreciation rate $\delta$ 0.000Death rate $\theta$ 0.000Fixed cost capital $f_k$ 0.000Fixed cost labor $f_n$ 0.000Financial constraint parameter $\lambda$ 2.000Common TFP parameter $A$ 1.000Capital share $\alpha$ 0.297Labor share $\beta$ 0.603Returns to scale $\alpha + \beta$ 0.900Interest rate $r^*$ 0.030Effect of productivity on effective labor supply $\eta$ 0.000Productivity drift parameter $\nu$ 0.163Productivity yearly autocorrelation $e^{-\nu}$ 0.850Productivity mean $\bar{z}$ 1.148Poisson arrival rate0.100Parameter of Pareto distribution of Poisson shocks1.100	Discount rate entrepreneurs	$ ho_e$	0.050
Inverse Frisch elasticity $\varphi$ 1.000  Depreciation rate $\delta$ 0.000  Death rate $\theta$ 0.000  Fixed cost capital $f_k$ 0.000  Fixed cost labor $f_n$ 0.000  Financial constraint parameter $\lambda$ 2.000  Common TFP parameter $\lambda$ 1.000  Capital share $\lambda$ 0.297  Labor share $\lambda$ 0.603  Returns to scale $\lambda$ 0.900  Interest rate $\lambda$ 0.900  Effect of productivity on effective labor supply $\lambda$ 0.000  Productivity drift parameter $\lambda$ 0.163  Productivity standard deviation parameter $\lambda$ 0.300  Productivity mean $\lambda$ 1.148  Poisson arrival rate $\lambda$ 0.100  Parameter of Pareto distribution of Poisson shocks 0.100	Discount rate workers	$ ho_w$	0.030
Depreciation rate $\delta$ 0.000  Death rate $\theta$ 0.000  Fixed cost capital $f_k$ 0.000  Fixed cost labor $f_n$ 0.000  Financial constraint parameter $\lambda$ 2.000  Common TFP parameter $\lambda$ 1.000  Capital share $\lambda$ 0.297  Labor share $\lambda$ 0.603  Returns to scale $\lambda$ 0.900  Interest rate $\lambda$ 0.900  Effect of productivity on effective labor supply $\lambda$ 0.000  Productivity drift parameter $\lambda$ 0.163  Productivity yearly autocorrelation $\lambda$ 0.300  Productivity standard deviation parameter $\lambda$ 0.300  Productivity mean $\lambda$ 1.148  Poisson arrival rate $\lambda$ 0.100  Parameter of Pareto distribution of Poisson shocks 0.100	Relative risk aversion	$\gamma$	1.000
Death rate $\theta$ 0.000  Fixed cost capital $f_k$ 0.000  Fixed cost labor $f_n$ 0.000  Financial constraint parameter $\lambda$ 2.000  Common TFP parameter $A$ 1.000  Capital share $\alpha$ 0.297  Labor share $\beta$ 0.603  Returns to scale $\alpha + \beta$ 0.900  Interest rate $\alpha$ 0.300  Effect of productivity on effective labor supply $\eta$ 0.000  Productivity drift parameter $\nu$ 0.163  Productivity wearly autocorrelation $\nu$ 0.850  Productivity standard deviation parameter $\nu$ 0.300  Productivity mean $\nu$ 1.148  Poisson arrival rate $\nu$ 0.100  Parameter of Pareto distribution of Poisson shocks $\nu$ 1.100	Inverse Frisch elasticity	$\varphi$	1.000
Fixed cost capital $f_k$ 0.000  Fixed cost labor $f_n$ 0.000  Financial constraint parameter $\lambda$ 2.000  Common TFP parameter $A$ 1.000  Capital share $\alpha$ 0.297  Labor share $\beta$ 0.603  Returns to scale $\alpha + \beta$ 0.900  Interest rate $\alpha$ 0.900  Effect of productivity on effective labor supply $\alpha$ 0.000  Productivity drift parameter $\alpha$ 0.163  Productivity yearly autocorrelation $\alpha$ 0.850  Productivity standard deviation parameter $\alpha$ 0.300  Productivity mean $\alpha$ 1.148  Poisson arrival rate $\alpha$ 0.100  Parameter of Pareto distribution of Poisson shocks 1.100	Depreciation rate	δ	0.000
Fixed cost labor  Financial constraint parameter  Common TFP parameter  Capital share  Capital share  Capital share  Capital share $\alpha$ $\alpha$ $\alpha$ $\alpha$ $\alpha$ $\alpha$ $\alpha$ $\alpha$	Death rate	$\theta$	0.000
Financial constraint parameter $\lambda$ 2.000 Common TFP parameter $A$ 1.000 Capital share $\alpha$ 0.297 Labor share $\beta$ 0.603 Returns to scale $\alpha + \beta$ 0.900 Interest rate $\alpha$ 0.300 Effect of productivity on effective labor supply $\alpha$ 0.000 Productivity drift parameter $\alpha$ 0.163 Productivity standard deviation parameter $\alpha$ 0.300 Productivity mean $\alpha$ 0.300 Productivity mean $\alpha$ 0.100 Parameter of Pareto distribution of Poisson shocks 1.100 Capital share $\alpha$ 0.100	Fixed cost capital	$f_k$	0.000
Common TFP parameter $A$ 1.000Capital share $\alpha$ 0.297Labor share $\beta$ 0.603Returns to scale $\alpha + \beta$ 0.900Interest rate $r^*$ 0.030Effect of productivity on effective labor supply $\eta$ 0.000Productivity drift parameter $\nu$ 0.163Productivity yearly autocorrelation $e^{-\nu}$ 0.850Productivity standard deviation parameter $\sigma$ 0.300Productivity mean $\bar{z}$ 1.148Poisson arrival rate0.100Parameter of Pareto distribution of Poisson shocks1.100	Fixed cost labor	$f_n$	0.000
Capital share $\alpha$ 0.297Labor share $\beta$ 0.603Returns to scale $\alpha + \beta$ 0.900Interest rate $r^*$ 0.030Effect of productivity on effective labor supply $\eta$ 0.000Productivity drift parameter $\nu$ 0.163Productivity yearly autocorrelation $e^{-\nu}$ 0.850Productivity standard deviation parameter $\sigma$ 0.300Productivity mean $\bar{z}$ 1.148Poisson arrival rate0.100Parameter of Pareto distribution of Poisson shocks1.100	Financial constraint parameter	$\lambda$	2.000
Labor share $\beta$ 0.603 Returns to scale $\alpha + \beta$ 0.900 Interest rate $r^*$ 0.030 Effect of productivity on effective labor supply $\eta$ 0.000 Productivity drift parameter $\nu$ 0.163 Productivity yearly autocorrelation $e^{-\nu}$ 0.850 Productivity standard deviation parameter $\sigma$ 0.300 Productivity mean $\bar{z}$ 1.148 Poisson arrival rate 0.100 Parameter of Pareto distribution of Poisson shocks 1.100	Common TFP parameter	A	1.000
Returns to scale $\alpha + \beta$ 0.900Interest rate $r^*$ 0.030Effect of productivity on effective labor supply $\eta$ 0.000Productivity drift parameter $\nu$ 0.163Productivity yearly autocorrelation $e^{-\nu}$ 0.850Productivity standard deviation parameter $\sigma$ 0.300Productivity mean $\bar{z}$ 1.148Poisson arrival rate0.100Parameter of Pareto distribution of Poisson shocks1.100	Capital share	$\alpha$	0.297
Interest rate $r^*$ 0.030  Effect of productivity on effective labor supply $\eta$ 0.000  Productivity drift parameter $\nu$ 0.163  Productivity yearly autocorrelation $e^{-\nu}$ 0.850  Productivity standard deviation parameter $\sigma$ 0.300  Productivity mean $\bar{z}$ 1.148  Poisson arrival rate 0.100  Parameter of Pareto distribution of Poisson shocks 1.100	Labor share	β	0.603
Effect of productivity on effective labor supply $\eta$ 0.000  Productivity drift parameter $\nu$ 0.163  Productivity yearly autocorrelation $e^{-\nu}$ 0.850  Productivity standard deviation parameter $\sigma$ 0.300  Productivity mean $\bar{z}$ 1.148  Poisson arrival rate 0.100  Parameter of Pareto distribution of Poisson shocks 1.100	Returns to scale	$\alpha + \beta$	0.900
Productivity drift parameter $\nu$ 0.163  Productivity yearly autocorrelation $e^{-\nu}$ 0.850  Productivity standard deviation parameter $\sigma$ 0.300  Productivity mean $\bar{z}$ 1.148  Poisson arrival rate 0.100  Parameter of Pareto distribution of Poisson shocks 1.100	Interest rate	$r^*$	0.030
Productivity yearly autocorrelation $e^{-\nu}$ 0.850  Productivity standard deviation parameter $\sigma$ 0.300  Productivity mean $\bar{z}$ 1.148  Poisson arrival rate 0.100  Parameter of Pareto distribution of Poisson shocks 1.100	Effect of productivity on effective labor supply	$\eta$	0.000
Productivity standard deviation parameter $\sigma$ 0.300  Productivity mean $\bar{z}$ 1.148  Poisson arrival rate 0.100  Parameter of Pareto distribution of Poisson shocks 1.100	Productivity drift parameter	ν	0.163
Productivity mean $\bar{z}$ 1.148  Poisson arrival rate 0.100  Parameter of Pareto distribution of Poisson shocks 1.100	Productivity yearly autocorrelation	$e^{-\nu}$	0.850
Poisson arrival rate  O.100  Parameter of Pareto distribution of Poisson shocks  1.100	Productivity standard deviation parameter	$\sigma$	0.300
Parameter of Pareto distribution of Poisson shocks  1.100	Productivity mean	$\bar{z}$	1.148
0.100	Poisson arrival rate		0.100
Contraction of initial distribution $\chi$ 0.100	Parameter of Pareto distribution of Poisson shocks		1.100
	Contraction of initial distribution	$\chi$	0.100

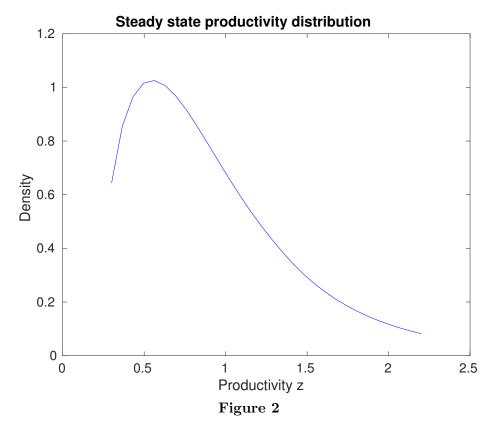
## 2.3 Iteration parameters

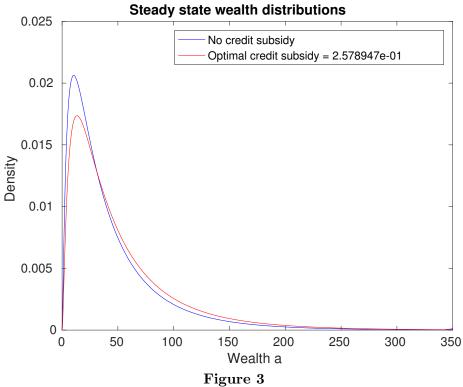
Number of grid points assets		200.000
Number of grid points productivity		30.000
Number of grid points time		150.000
Number of time periods		150.000
Max assets	$a_{max}$	350.000
Mean wealth relative to steady state		0.100
Range of initial credit subsidy rate tested	$\varsigma_0$	[0.900, 1.000]
Range of final credit subsidy rate tested		[-0.800,-0.700]

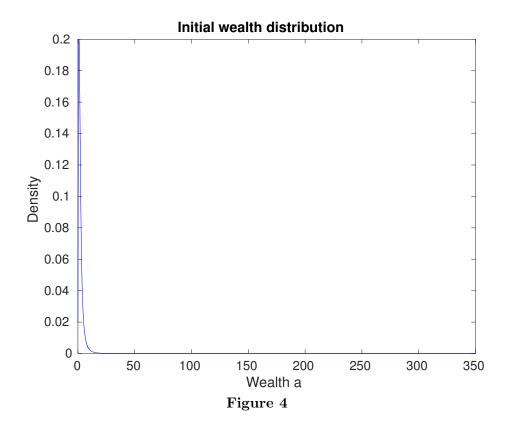
### 3 Figures

Optimal steady state credit subsidy rate = 0.258









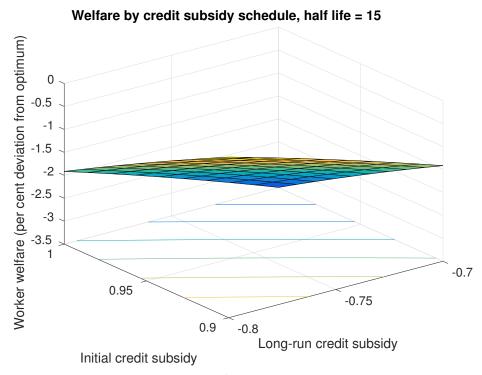


Figure 5

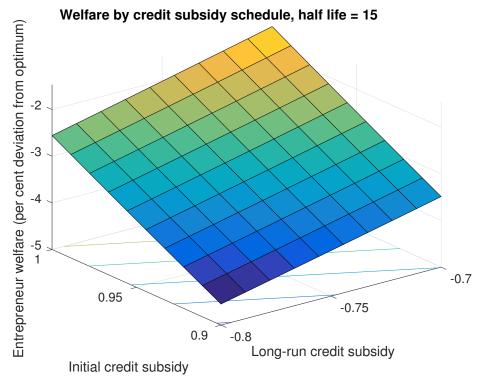


Figure 6

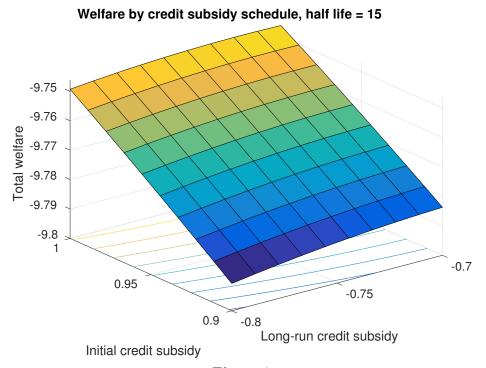


Figure 7

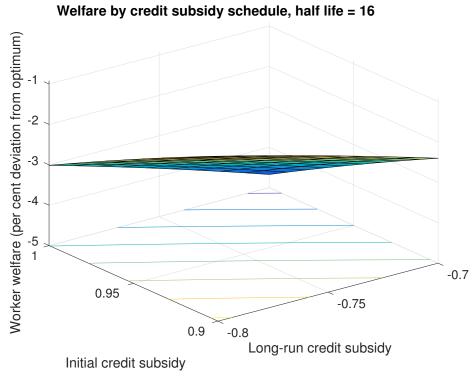


Figure 8

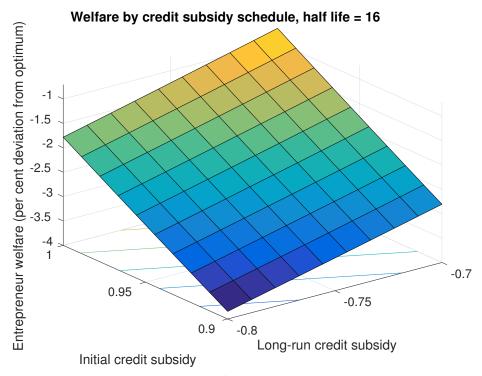


Figure 9

#### Welfare by credit subsidy schedule, half life = 16

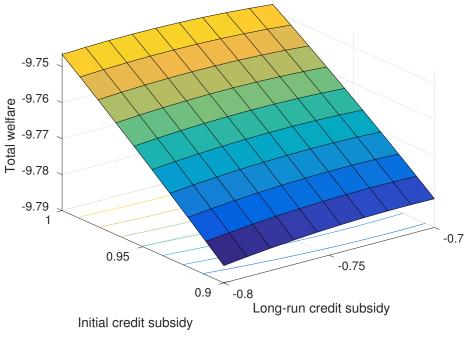


Figure 10

#### Welfare by credit subsidy schedule, half life = 17

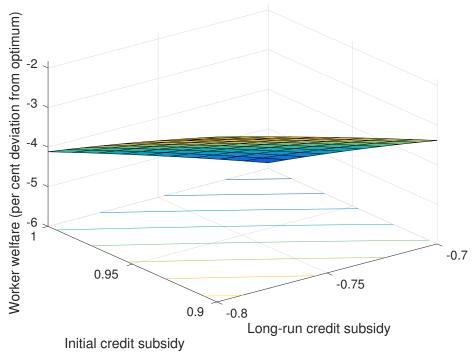


Figure 11

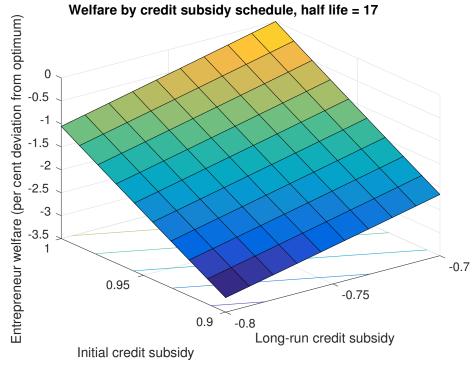


Figure 12



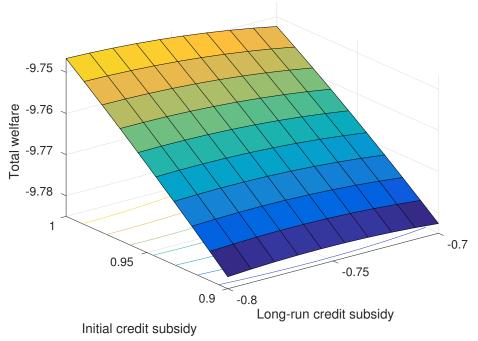
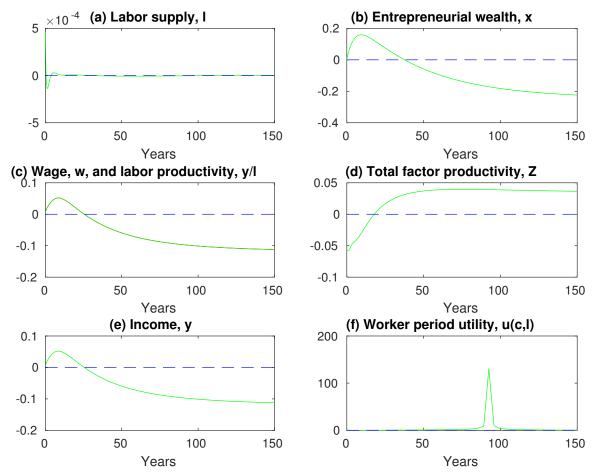


Figure 13



 ${\bf Figure}~{\bf 14}-{\bf Proportional~deviations~of~optimal~credit~subsidy~equilibrium~from~the~laissez-faire~equilibrium}$ 

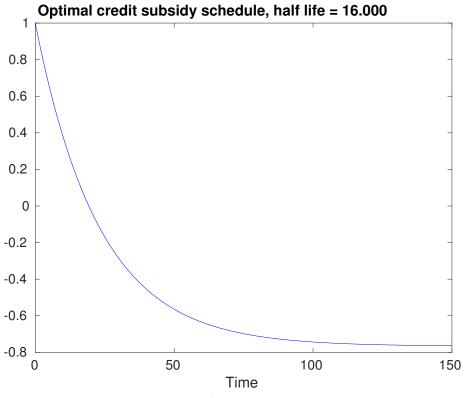
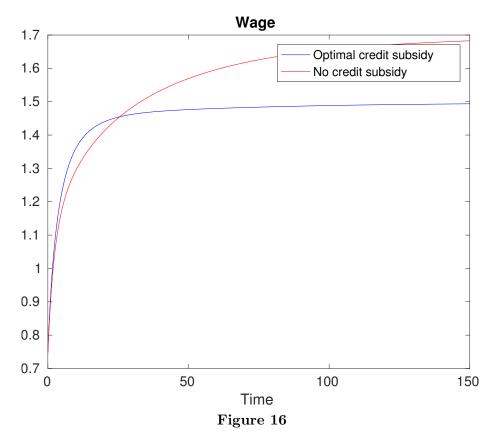
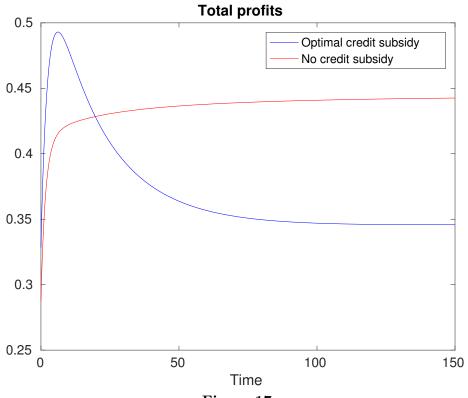


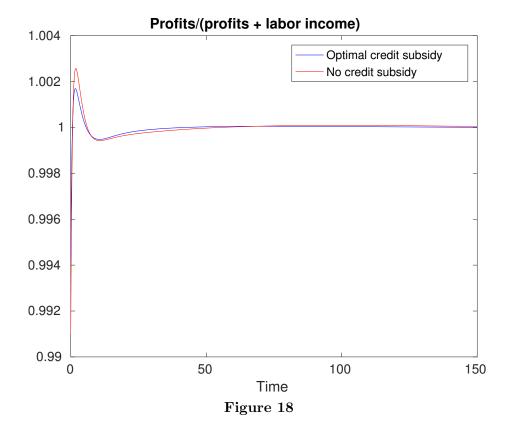
Figure 15

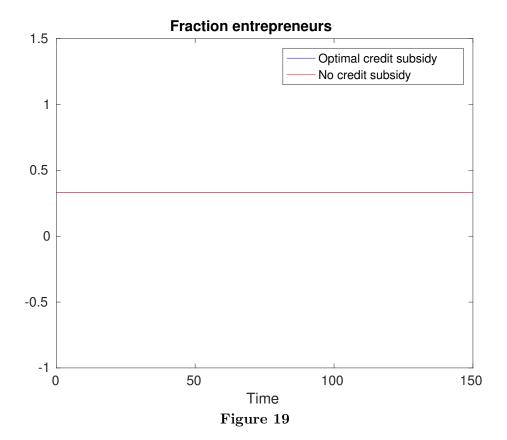


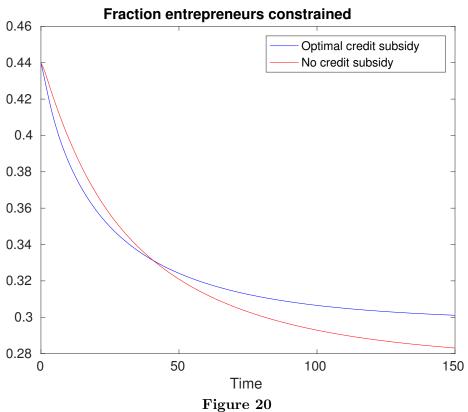
15

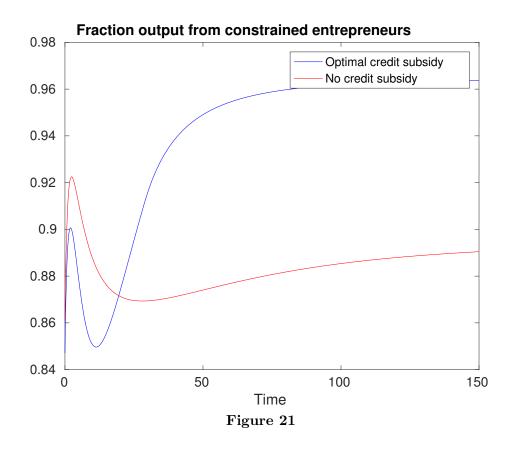


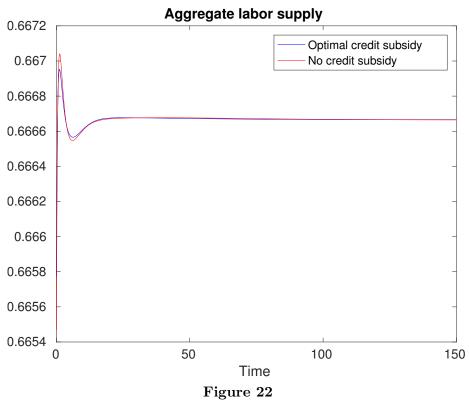


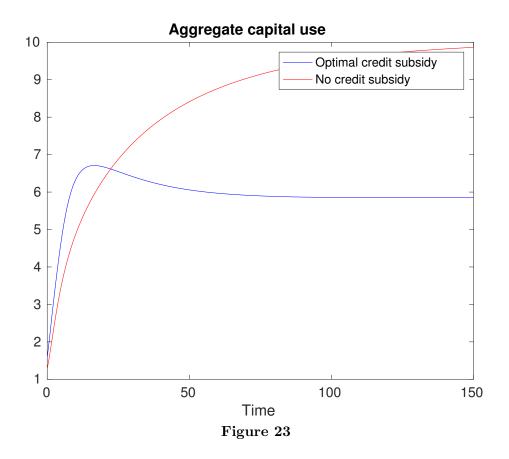












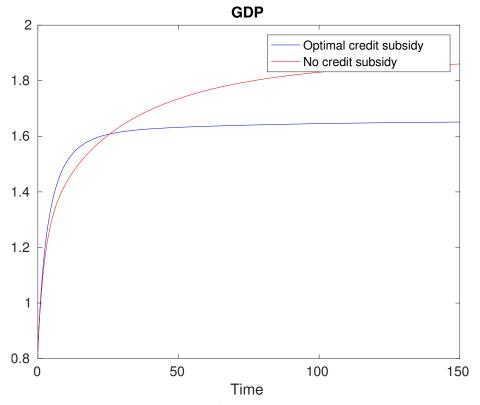


Figure 24

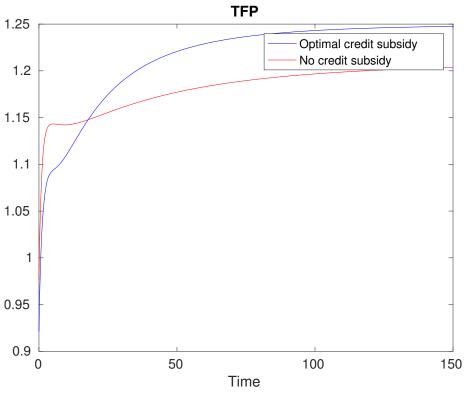
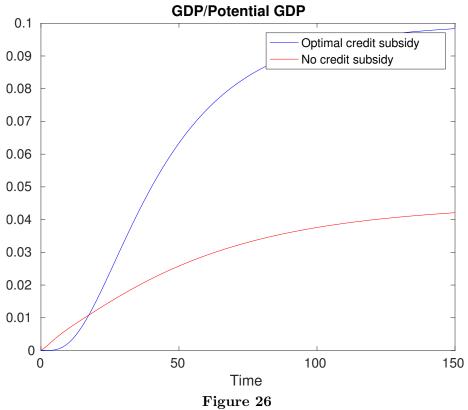
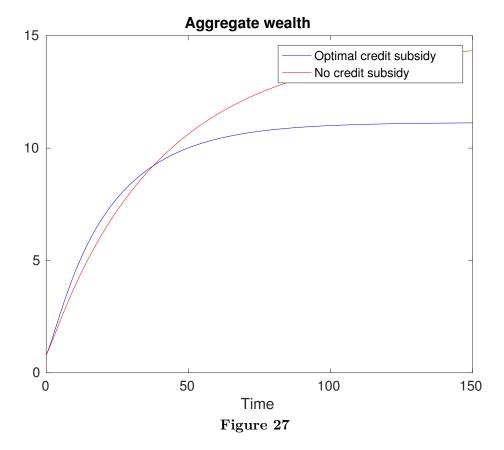


Figure 25





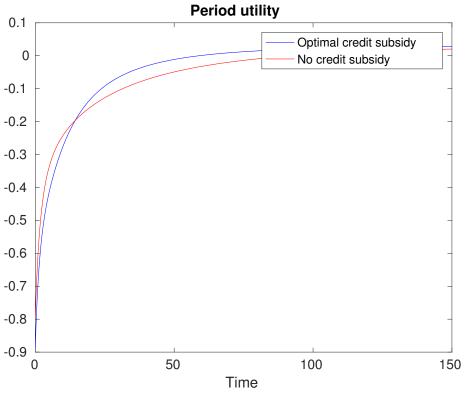
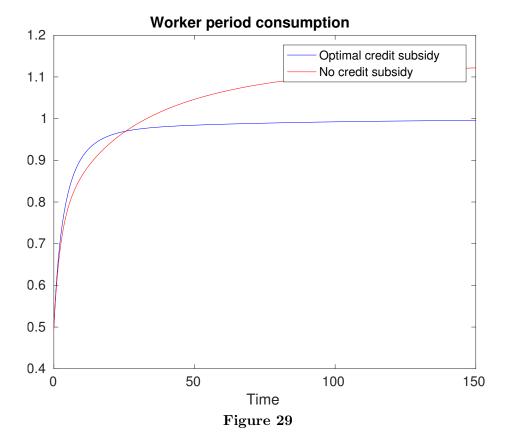


Figure 28



22