You are supposed to answer ALL questions. The assignments (1A)-(3D) all carry the same weight in the assessment. The end of each question is marked by #.

Part 1: Effective marginal tax rates

Consider individuals facing the budget constraint

$$(1 + t_x)x = z - t_L + b, \tag{1}$$

where x is consumption, z is labor earnings, b is a public transfer, t_x is a tax rate on consumption and t_L is a lump sum tax. The public transfer is phased out with earnings at a rate q so that

$$b = \bar{b} - qz, \tag{2}$$

where $\bar{b}$ is fixed.

(1A) Show that a marginal increase in labor earnings increases individual consumption by

$$\frac{dx}{dz} = \frac{1 - q}{1 + t_x}, \tag{3}$$

and compute the effective marginal tax rate (m) by using the formula $\frac{dx}{dz} = 1 - m$.

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(1B) Provide an interpretation of equation (3). How do t_x, t_L and q affect the incentive to earn income.

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The government considers a reform that changes the public transfer into a universal basic income that pays out the same benefits to everybody irrespectively of their income ($b = \bar{b}$). The reform is budget neutral and in order to finance the expansion of benefits, the goverment plans to introduce a proportional tax on labor earnings (t_z), so that the new budget constraint will be

$$(1 + t_x)x = z - t_z z - t_L + b. \tag{4}$$

(1C) Discuss the effect of the proposed reform on the incentives to earn income and the likely effects on labor supply.

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Part 2: The socially optimal top tax rate

Consider an economy with N high income individuals. Their preferences are represented by the utility function

$$u(c_i, z_i) = c_i - \frac{1}{1+\frac{1}{\varepsilon}} z_i^{1+\frac{1}{\varepsilon}}, \tag{5}$$

where c_i is consumption, z_i is labor income and ε is a preference parameter. The budget constraint is given by

$$c_i = z_i - T(z_i), \tag{6}$$

where $T(z_i)$ is a tax function. Assume that the tax function is described by

$$T(z_i) = m_L K + m_H (z_i - K) \tag{7}$$

where K is a threshold, which is below the individuals' optimal labor income z_i^*, while m_L and $m_H > m_L$ are marginal tax rates.

(2A) Illustrate the budget set created by the tax system and the optimum of one individual in a diagram with labor income (z) on the x-axis and consumption (c) on the y-axis. Show that the individuals' optimum is characterized by $z_i^* = (1-m_H)^{\varepsilon}$.

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The total tax revenue (R) from the high income individuals can be written as

$$R = \sum_i T(z_i) = \sum_i [m_L K + m_H (z_i - K)] \tag{8}$$

(2B) Show that the effect of a change in m_H on the total tax revenue can be written as

$$\frac{dR}{dm_H} = N(\bar{z} - K) - N \frac{m_H}{1-m_H} \varepsilon \bar{z}, \tag{9}$$

where $\bar{z} = \frac{1}{N}\sum_i z_i$ and $\varepsilon = \frac{dz_i}{d(1-m_H)} \frac{1-m_h}{z_i}$ is the labor supply elasticity, which is assumed constant for all individuals. Describe the result in equation (9). How does it relate to the mechanical (dM) and behavioral (dB) effects of the change in m_H?

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The government considers a reform that increases m_H marginally. The extra tax revenue is paid back to everyone in the economy lump sum.

(2C) Argue why the effect of an increase in m_H on aggregate social welfare (W) can be written as

$$dW = dM + dB - g_H dM, \tag{10}$$

where $g_H < 1$ is the marginal social welfare weight on individuals with labor income above K relative to everyone in the economy.

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(2D) Use the equations (9) and (10) to show that the socially optimal top tax rate (m_H^*) is given by

$$m_H^* = \frac{1 - g_H}{1 - g_H + \varepsilon\alpha}, \tag{11}$$

where $\alpha \equiv \frac{\bar{z}}{\bar{z} - K}$.

#

The table below reports the size of m_H^* for different values of ε, α and g_H.

The socially optimal top tax rate

α:	3.4	3.4	1.8	1.8
ε:	0.1	0.3	0.1	0.3
$g_H = 0$	74.6%	49.5%	84.7%	64.9%
$g_H = 0.6$	54.1%	28.2%	69.0%	42.6%

(2E) Provide a thorough discussion of the importance of ε, α and g_H for the socially optimal top tax rate.

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Part 3: Social insurance

Consider an unemployed individual, who has to decide how hard to search for a new job. If the individual chooses a search effort of e, she finds a job with probability $p(e) = e$. Searching for a new job has the disutility cost of $v(e)$ with $v'(e) > 0$ and $v''(e) > 0$. Once employed, the individual earns an income of z and pays taxes tz. If the individual remains unemployed, he receives the benefits b. The individual's expected utility is given by:

$$U = e \cdot u\left(z(1-t)\right) + (1-e) \cdot u(b) - v(e), \tag{12}$$

where $u(\cdot)$ is the utility of consumption with $u'(\cdot) > 0$ and $u''(\cdot) < 0$.

The government's budget constraint is given by $e \cdot t \cdot z = (1-e)b$.

(3A) Show that the first best insurance scheme (where the government can control e directly) implies that individuals have full insurance ($z(1-t) = b$). Explain why full insurance is optimal in this case.

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(3B) Consider instead the situation, where the government sets b and t without being able to observe (or control) e. Show that the individual optimization, when b and t are taken as given, implies $v'(e) = u(z(1-t)) - u(b)$. What would be the consequence if the individual had full insurance in this case?

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The article "Cash-on-Hand and Competing Models of Intertemporal Behavior: New Evidence from the Labor Market" in the Quarterly Journal of Economics (2007) by Card, Chetty and Weber studies the effects of unemployment benefits (and severance payments) on unemployment using data from Austria. Below (next page) is a copy of Figure 2, Figure 8 and Figure 10 from the article.

(3C) Describe the empirical analysis. What do the figures imply in terms of the effect of unemployment benefits (and severance payments) on the duration of unemployment and the match quality of the subsequent job.

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(3D) Provide an argument for whether or not the results in Card, Chetty and Weber (2007) are likely to be causal estimates of the effects of unemployment benefits. Is there anything in the graphs that validates or invalidates a causal interpretation?

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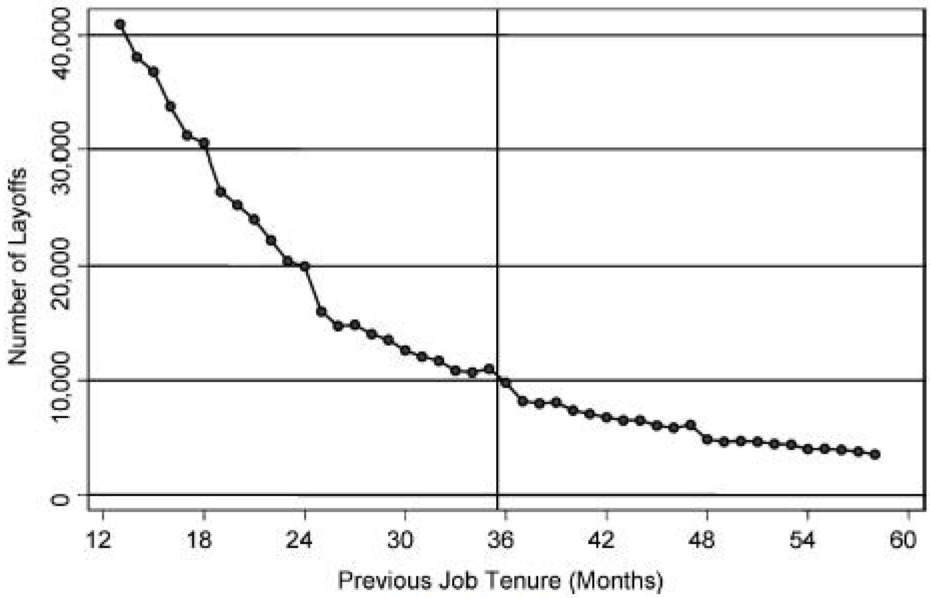

FIGURE II

Frequency of Layoffs by Job Tenure

Note. In this figure, individuals in the analysis sample are grouped into "tenure-month" categories based on the number of whole months they worked at the firm from which they were laid off. The figure plots the frequency of layoffs by tenure-month category, that is, the total number of individuals in the sample within each tenure-month category. The vertical line denotes the cutoff for severance pay eligibility.

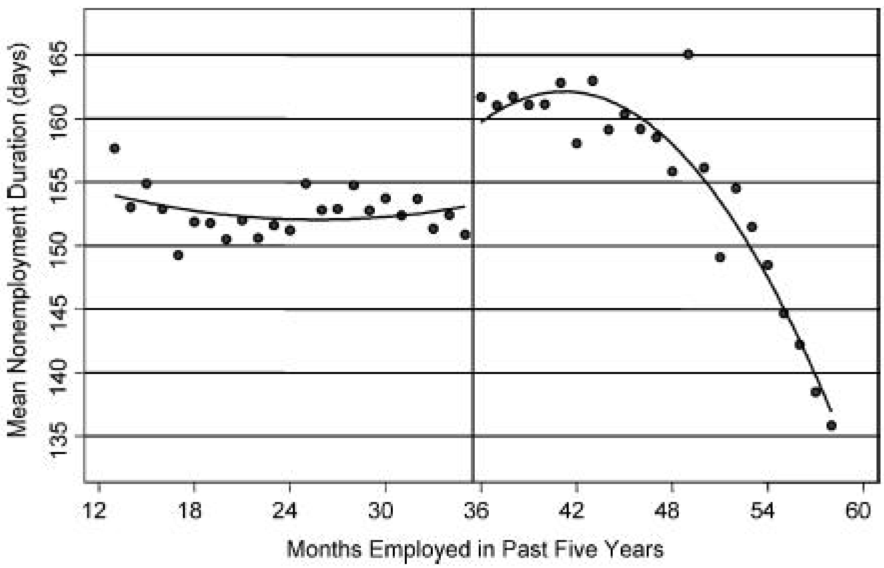

FIGURE VIIIa
Effect of Benefit Extension on Nonemployment Durations

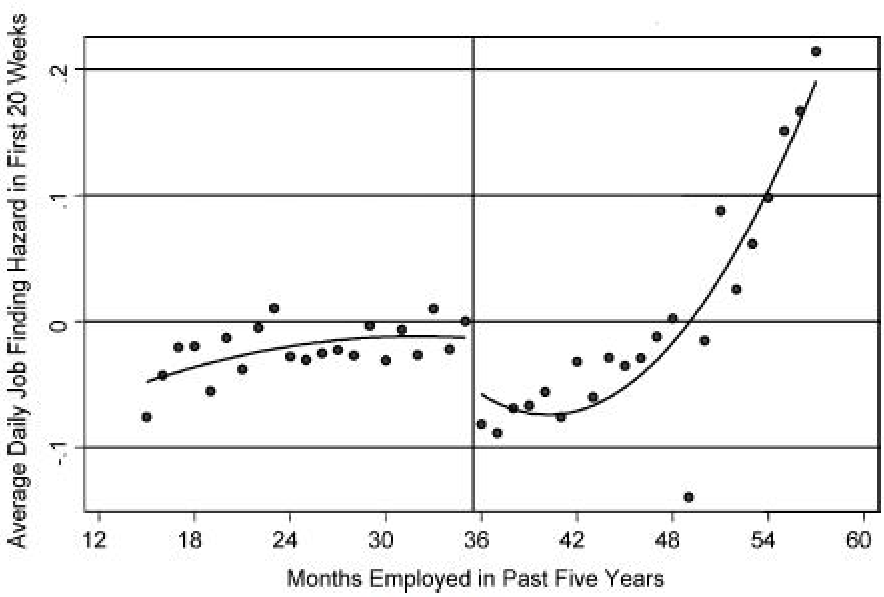

FIGURE VIIIb
Effect of Extended Benefits on Job-Finding Hazards

Note. In these figures, individuals are grouped into "months-employed" categories based on the number of whole months they worked at any firm within the past five years. Figure VIIIa plots mean nonemployment durations, excluding observations with nonemployment durations of more than two years. Figure VIIIb plots coefficients from a Cox model analogous to that used in Figure VI, controlling for the severance pay effect using a cubic polynomial. The values plotted can be interpreted as the percentage difference in the average job finding hazard during the first twenty weeks of the spell between each months-worked group and the group with months-worked equal to 35.

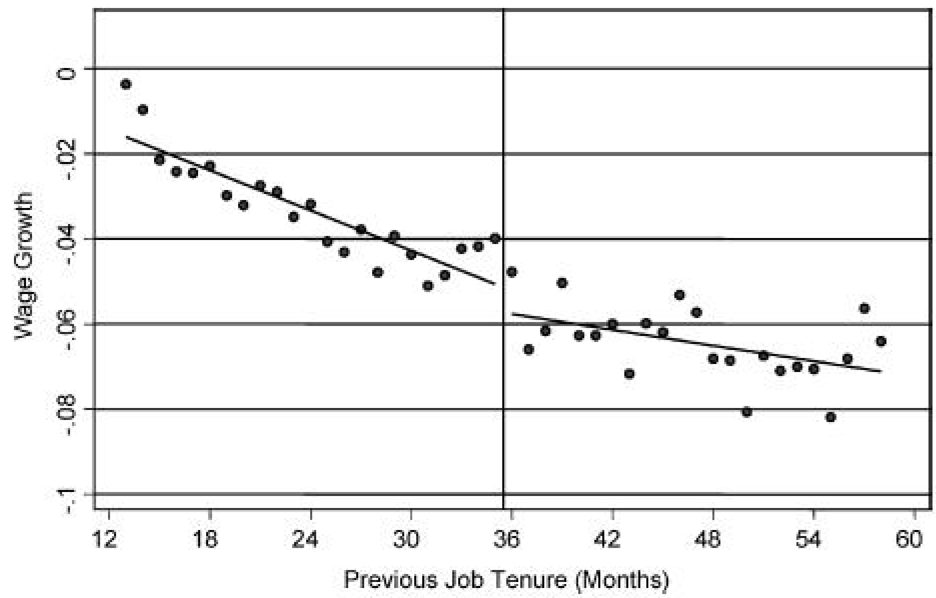

FIGURE Xa
Effect of Severace Pay on Subsequent Wages

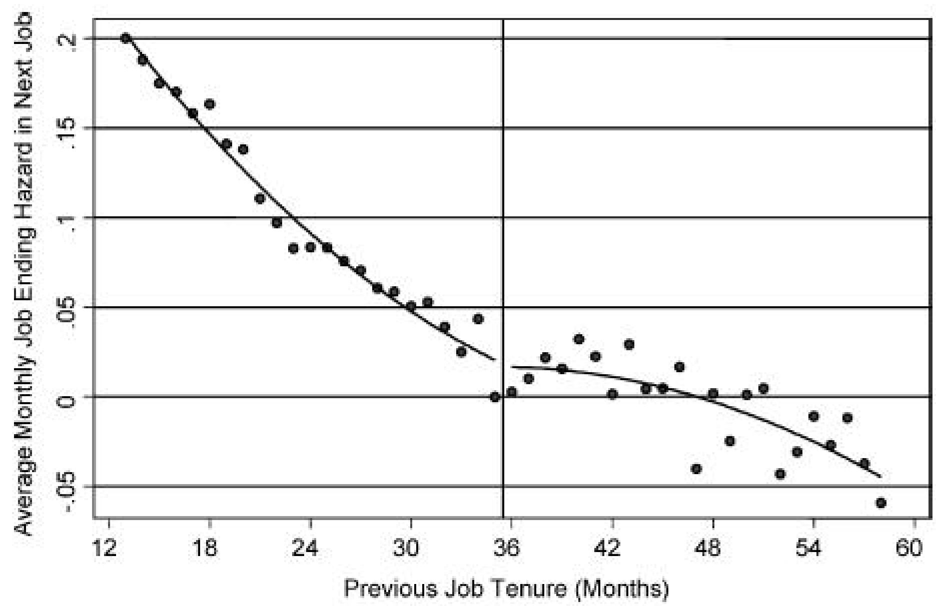

FIGURE Xb
Effect of Severance Pay on Subsequent Job Duration

Note. Figure Xa plots average wage growth (difference in log annual wage between next job and the job from which the individual was laid off) in each tenure-month group. Figure Xb plots coefficients from a Cox proportional hazards model for the duration of the next job with dummies for each job tenure category. The values can be interpreted as the percentage difference in the average job leaving hazard during the first five years of the next job between each job tenure group and the group with job tenure equal to 35. The sample for both figures includes all individuals observed in a new job.