

University of Waterloo  
Department of Economics  
ECON 202-002&-003 W2024  
Assignment # 1  
Due: February 5, by 11:59pm

1. For each of the following statements, explain whether they are normative or positive

a) High unemployment rates cannot be allowed to persist.

Normative/Positive	Explanation
Normative	The statement is opinionated and describes how the world should be, not how it is in actual fact.

b) The snow fall was too low to meet the region's criteria for salting the roads.

Normative/Positive	Explanation
Positive	The statement can be verified using empirical evidence, i.e the snow fall data compared to the region's criteria for salting roads. The statement is factual and objective in that it is describing how the world is in actual fact.

2. Suppose that you are working as a policy advisor for the Government and you are asked to design a model to predict the implications of minimum wage policy on employment, consumption and national saving levels.

a) Explain the type of model you would like to use, according to the following classifications: general versus partial equilibrium, and stochastic versus deterministic. Be sure to defend your choices.

Choice (underline one)	Explanation:
<u>General</u> vs Partial	As the minimum wage policy affects multiple interconnected markets, a general equilibrium model is preferred. The partial equilibrium model only focuses on one market, e.g the labor market, and assumes the other markets remain constant, which is unrealistic as the minimum wage policy changes will affect many markets in the country at the same time. The general equilibrium model, however, accounts for the interconnected effects on the country, e.g changes in household expenditure, firms hiring and pricing strategy, and government policies such as taxation, making it more suitable.
<u>Stochastic</u> vs Deterministic	The stochastic model is preferred as economic markets have inherent unpredictability, and the model takes into account the randomness and unpredictability of the economy using probability distributions, while a deterministic model does not, and only produces a singular result based on the inputs to the model. This allows the prediction from the stochastic model to better reflect real-world economic fluctuations, as it accounts for variations in employment responses, consumer behavior and business investment decisions changes. The range of possible outcomes produced from the stochastic model will allow the government to assess different scenarios, allowing the government to prepare for uncertainties.

b) Which variables would be exogenous and which would be endogenous in your model? Explain.

	Endog/Exogenous?	Explanation:
<b>Minimum Wage:</b>	Exogenous	The minimum wage is set by the government through policy decisions, making it an external factor not determined by market forces within the model. It is a policy input and the model takes it as a given. It is not a factor directly determined by market forces.
<b>Employment:</b>	Endogenous	Employment levels are determined within the model based on labor supply and demands. The changes in minimum wage will affect the employment decisions of firms and workers, hence it is a factor determined by market forces.
<b>Consumption:</b>	Endogenous	Consumption is dependent on income levels, employment and expectations, which are determined within the model. The changes to minimum wage affects the disposable income of the population, leading to changes in consumption. It is a factor determined by market forces.
<b>National Saving:</b>	Endogenous	National savings is influenced by household income, consumption, business investment and government policies. The changes in minimum wage will affect the behavior of workers and firms, leading to changes in their expenditure and savings. It is a factor determined by market forces.

3. For each of the following scenarios, will our measure of GDP over-estimate, under-estimate, or accurately reflect aggregate economic activity. Explain.

a) Visiting Algonquin Provincial Park using a paid day pass. (2)

**Answer:** Accurately reflected

**Explanation:** When an individual purchases a paid day pass, the expenditure is recorded in GDP under personal consumption. Since the transaction involves monetary exchange for a service/ product, it is captured correctly in the GDP calculations.

b) Cleaning up after a spill from an oil tanker off the coast of Nova Scotia. (2)

**Answer:** Over estimates

**Explanation:** GDP overestimates the economic activity as it takes into calculations the cleanup expenditure but ignores the losses caused by the spill, such as the destruction of marine ecosystems, harm to fisheries and loss of tourism revenue. Since GDP does not track the environment damage or quality of life reductions, it creates an illusion of increased economic activity when in fact, the spill is a net loss to society.

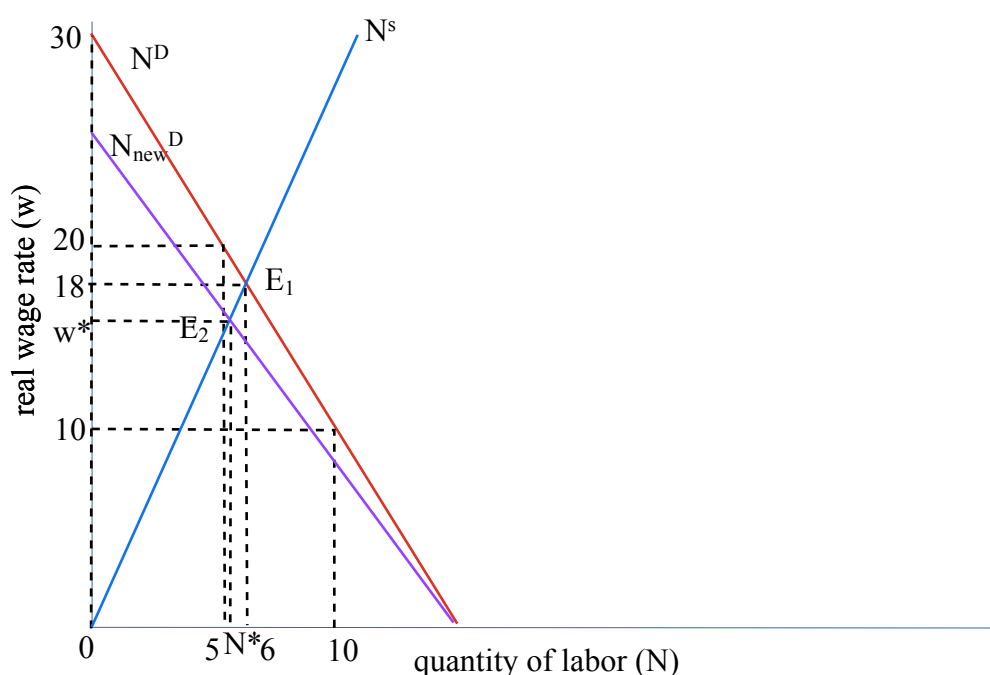
4. Suppose firms' hourly marginal product of labour is given by  $MPN = 30 - 2N$

a) Explain how the MPN function is related to the labour demand function and graph the labour demand curve using at least 3 points. Be sure to label both axes.

**How MPN is related to labour demand:**

The MPN represent the additional output produced by hiring one additional worker. Firms will hire workers up to the point where the value of MPN equals the real wage rate ( $w$ ). This means that the labor demand function can be directly derived from the MPN function by setting  $w = MPN = 30 - 2N$ . The labor demand curve shows the downward sloping relation ship between real wage rates ( $w$ ) and the number of workers hired ( $N$ ) as when wage decreases, the firms will demand more labor.

**Labour Market**



b) Suppose the aggregate supply of labour is  $N^S = \frac{1}{3} w$ . Find the equilibrium levels of employment ( $N$ ) and real wage rate  $w$ . Graph the labour supply curve using the same graph as part a), and label the equilibrium point  $E_1$ .

<b>w*:</b>	18
<b>N*:</b>	6
<b>Calculation:</b> $w = 30 - 2N^D$ $N^D = (30 - w)/2$ $N^S = w/3$ where $N^S = N^D$ , $(30 - w)/2 = w/3$ $w = 18$ $N^S = N^D = 6$	

c) If a payroll tax of  $\tau\%$  is imposed on firms, such that for each unit of  $w$  paid to the employee, the firm must pay  $\tau w$  to the government (assume  $\tau$  is between zero and one). What is the new labour demand curve function given this tax? Show this new curve graphically using the graph from part a). (3)

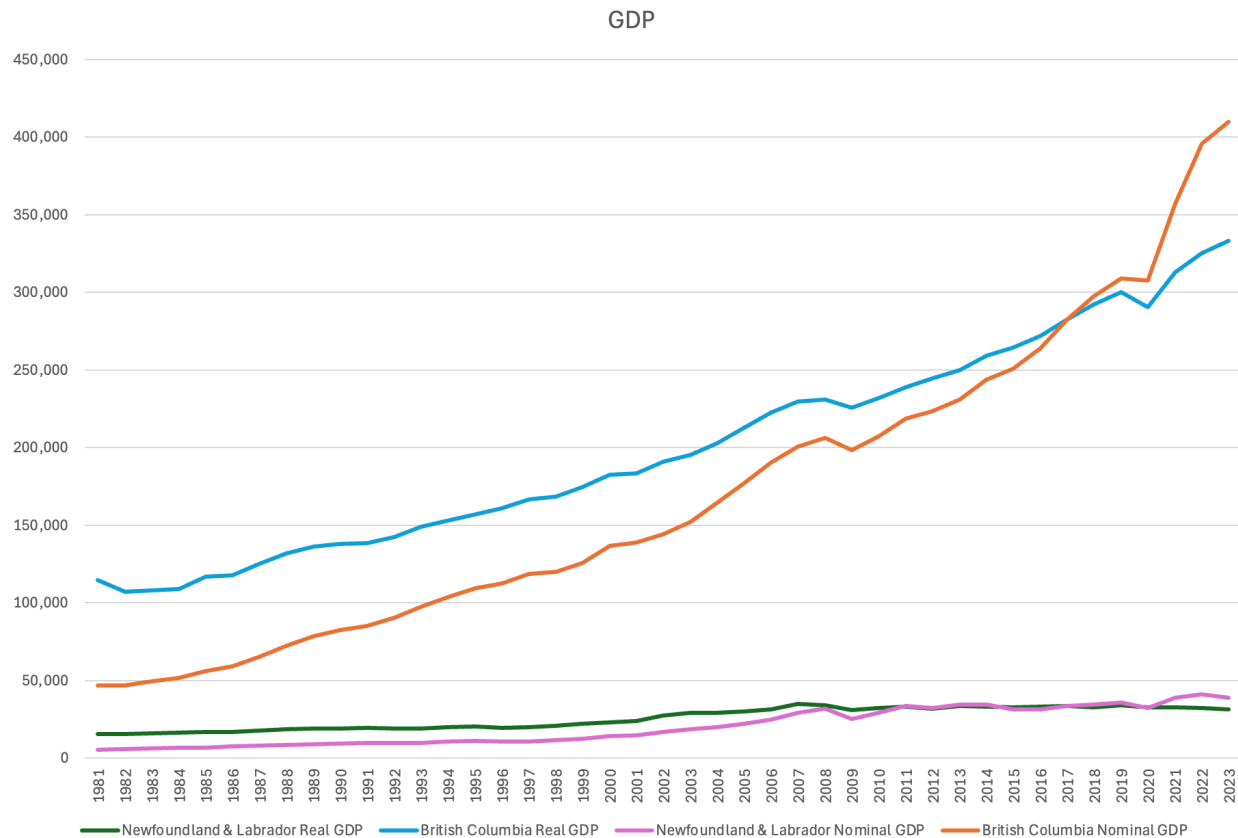
<b>New labour demand curve function:</b>	$(30-(1+t)w)/2$
<b>Explanation:</b> $w=30-2N^D$ $N^D=(30-w)/2$ when payroll tax imposed, $w_{new} = (1+t)w_{old}$ $N_{new}^D=(30-(1+t)w)/2$	
<b>Don't forget to show new labour demand on graph from part a)</b>	

d) Continuing with the payroll tax from part c, do not calculate the new  $w^*$  and  $N^*$ , but explain whether they will be higher or lower. Label the new equilibrium,  $E_2$ , on your graph from part a).

<b>New <math>w^*</math> higher or lower?</b>	Lower
<b>New <math>N^*</math> higher or lower?</b>	Lower
<b>Explanation:</b> When the payroll tax is implemented the cost of labor increases as firms have to spend more resources to obtain the same unit of labor. With the new payroll tax implemented, $(1+t)w=MPN$ , $w=MPN/(1+t)$ , since $MPN$ is constant as the unit of good produced per additional worker hired is the same, and $t$ is a positive number between 0 and 1, then $w$ is decreased. Hence the new $w^*$ will be lower. As the cost of employment increases, the firm hire fewer workers because the effective cost of labor has increased. Since we assume that $MPN=w(1+t)=30-2N$ , then $N=(30-(1+t)w)/2$ and since $t$ is a positive number between 0 and 1, then $N$ is now a smaller value. Hence $N^*$ decreased.	
<b>Don't forget to show Show new <math>w^*</math> and new <math>N^*</math> on graph &amp; label new equilibrium</b>	

5. Download annual Nominal and Real (chain weighted) GDP data for the province Newfoundland & Labrador, and for the province British Columbia for the years 1981-2023, using Statistics Canada table number 36-10-0222-01.

a) Graph Nominal and Real GDP for these two provinces across the 1981-2023 time period.



b) Describe three things that you observe looking at the data series you have plotted, and remark on what is useful/interesting/informative about each of these observations. (3)

<b>Observation 1:</b> British Columbia's nominal GDP and real GDP both show a consistent upward trend, with nominal GDP surpassing real GDP significantly after 2015. The gap between the two widens over time, particularly after 2020.	<b>Remarks:</b> This divergence indicates the impact of inflation, as nominal GDP is not adjusted for price changes, while real GDP is. The sharp increase in nominal GDP post-2020 suggests strong inflationary pressures or rapid economic growth during that period.
<b>Observation 2:</b> Both real and nominal GDP for Newfoundland & Labrador display fluctuations, especially between 2005–2015 and around 2019–2021. There are periods of sharp rises followed by declines.	<b>Remarks:</b> This volatility could be due to Newfoundland & Labrador's resource-dependent economy, possibly influenced by fluctuations in oil prices, fishing industry output, or other natural resource sectors. Economic shocks like the global financial crisis (2008–2009) and COVID-19 (2020) may have also contributed.
<b>Observation 3:</b> In both provinces, nominal GDP consistently exceeds real GDP, but the gap is much larger in British Columbia than in Newfoundland & Labrador. This gap has widened significantly post-2010 for British Columbia, while Newfoundland's nominal and real GDP remain closer together.	<b>Remarks:</b> This suggests that price levels (inflation) have increased more substantially in British Columbia compared to Newfoundland & Labrador. It could also reflect differences in cost of living, wage growth, and economic activity levels between the provinces.