



Investigate Employment Income and Place of Living by computational social science method

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01

Literature Review



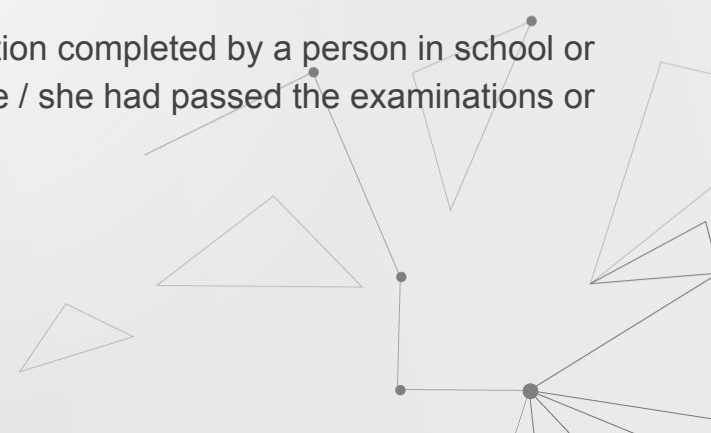
Objectives

- Examine the effect of employment income and education level
 - Examine the effect of employment income and occupation level
 - Use regression analysis to predict the outcomes
 - Use computational method to predict a group of participants
 - Find the relationship between employment income and place of living
-





Definition

- **Monthly income from main employment**
 - For employers or self-employed persons
 - the amount earned excluding expenses incurred in running their main business.
 - For employees
 - the total amount earned from their main employment including salary or wage, bonus, commission, overtime, housing allowance, tips and other cash allowances. New Year bonus and double pay are excluded
 - **Educational attainment (Highest level completed)**
 - Highest level completed is the highest level of education completed by a person in school or other educational institution, regardless of whether he / she had passed the examinations or assessments of the course.
 - **Occupation**
 - kind of work a person performed
- 

Literature review

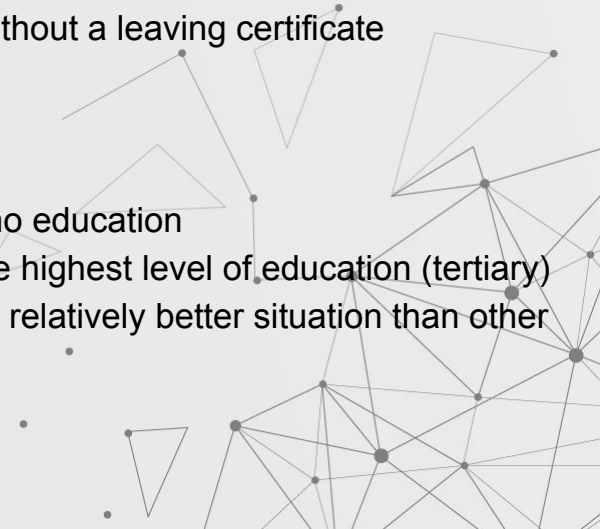
Does the Attained Level of Education Affect the Income Situation of Households?

(Jana Turčínková , Jana Stávková)

Measurement: Conventional EU measurement of relative poverty

The attained level of education in following four categories:

- Primary or no education
 - Learned a trade through apprenticeship, lower secondary education, without a leaving certificate
 - Full secondary, vocational or post secondary education
 - Higher (tertiary) education.
-
- Most vulnerable group comprises households with primary education or no education
 - Households with lowest income are the ones headed by a person with the highest level of education (tertiary)
 - Households with head of households with tertiary education level are in a relatively better situation than other categories of households (with lower level of attained education)



Literature review

Where Work Pays

How Does Where You Live Matter for Your Earnings?

(Lauren Bauer, Audrey Breitwieser, Ryan Nunn, and Jay Shambaugh)

Location and occupation matter for earnings

- Analysis typical earnings in an occupation, the value of those earnings after adjusting for taxes and cost of living—vary across the United States
- Examine some of the reasons why places have such different labor markets
- Educational and occupational choices matter a great deal to workers' careers.
- Where workers choose to live matters significantly in many occupations.



Median Annual Earnings for Registered Nurses, by Location

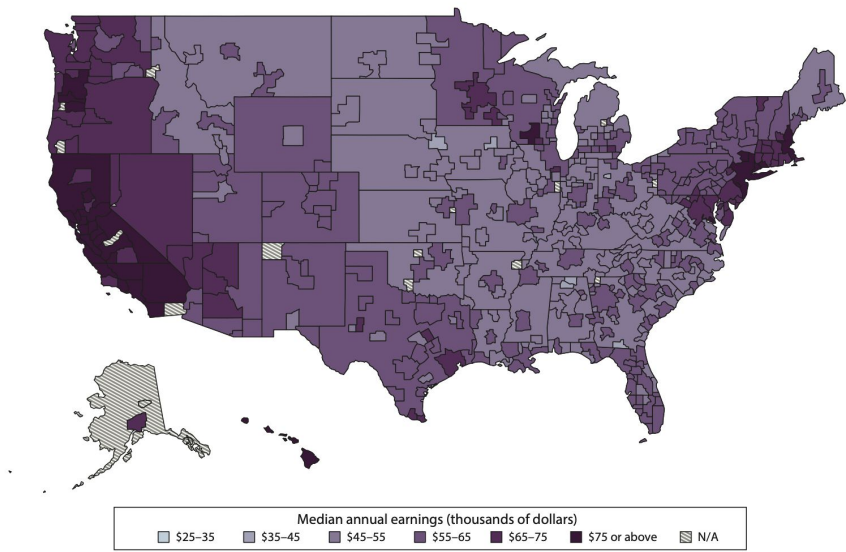
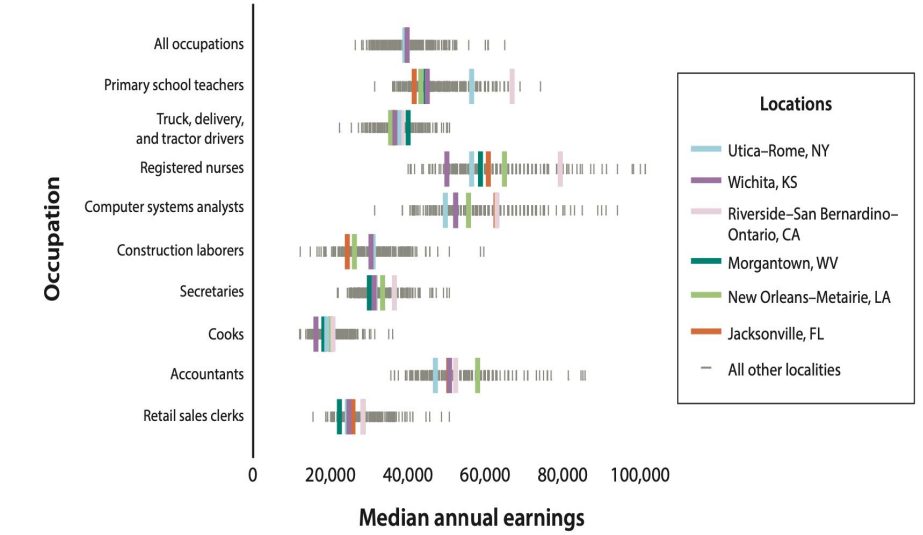
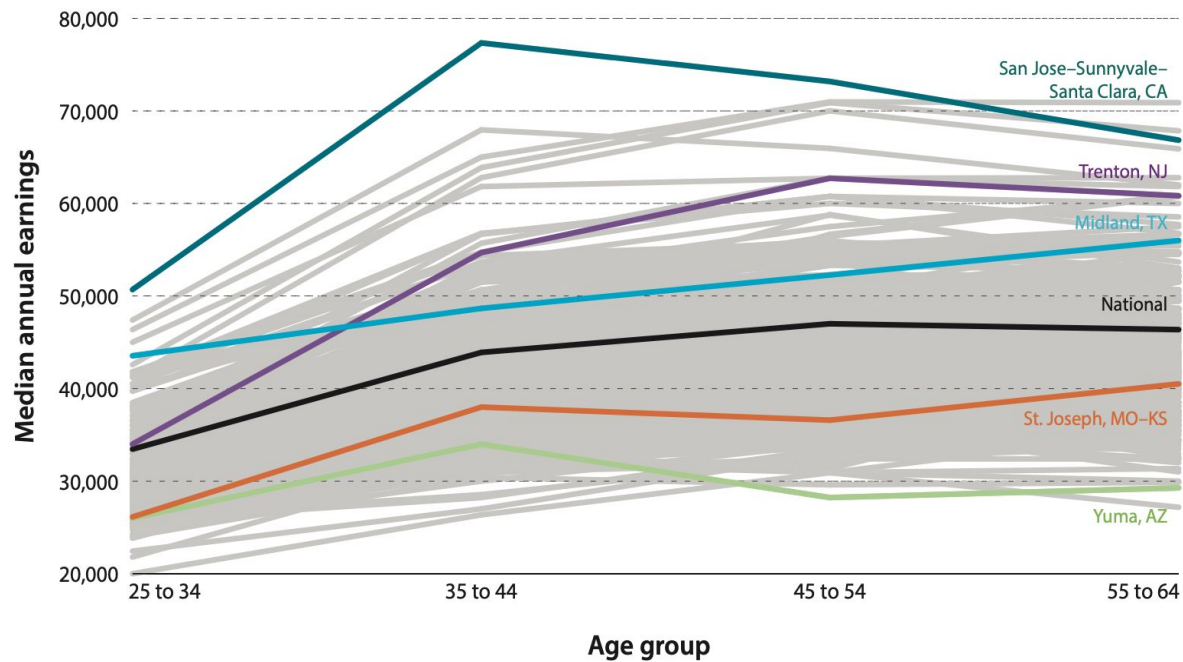


FIGURE 3.

Distribution of Median Annual Earnings across Locations, Selected Occupations



Median Annual Earnings, by Age Group and Location





02

Hypothesis

Hypotheses

- ❑ **Employment income would be higher with higher educational level**
- ❑ **Professional occupation has positively associated to employment income**
- ❑ **Citizens with different educational background, age, occupational have different income level**
- ❑ **Where citizens live matter to their employment income**



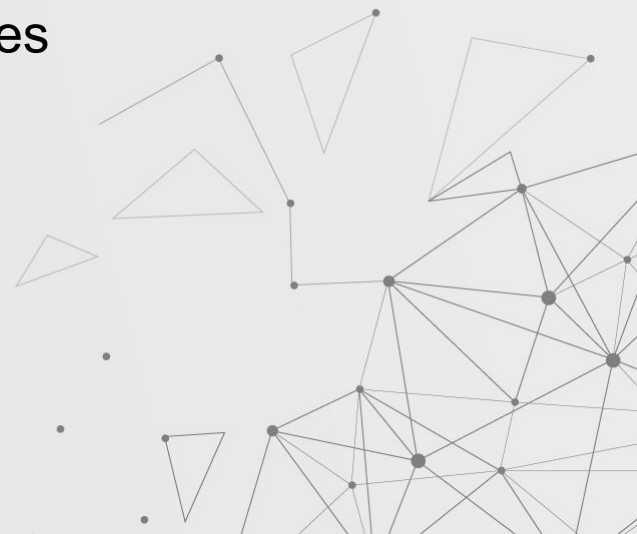


03

Data

2011 Population Census

- obtain up-to-date information: demographic, socio-economic characteristics, geographic distribution
- Important for planning and policy formulation
- essential to for business and research purposes





2011 Population Census

- data were collected by face-to-face interviews
- postal return of completed short-form questionnaire
- self-enumeration of both long-form and short-form questionnaire via the Internet
- Self-enumeration approach important means of data collection



Summary of 2011 Population Census

3,6878

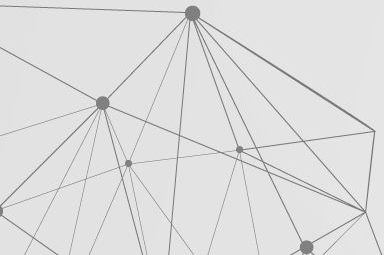
Individual data

112

variables

5%

Total Censu data



Planning



**Literature
Review**



**Variables
Define**



**Computational
Social Science
Method**



Visualization



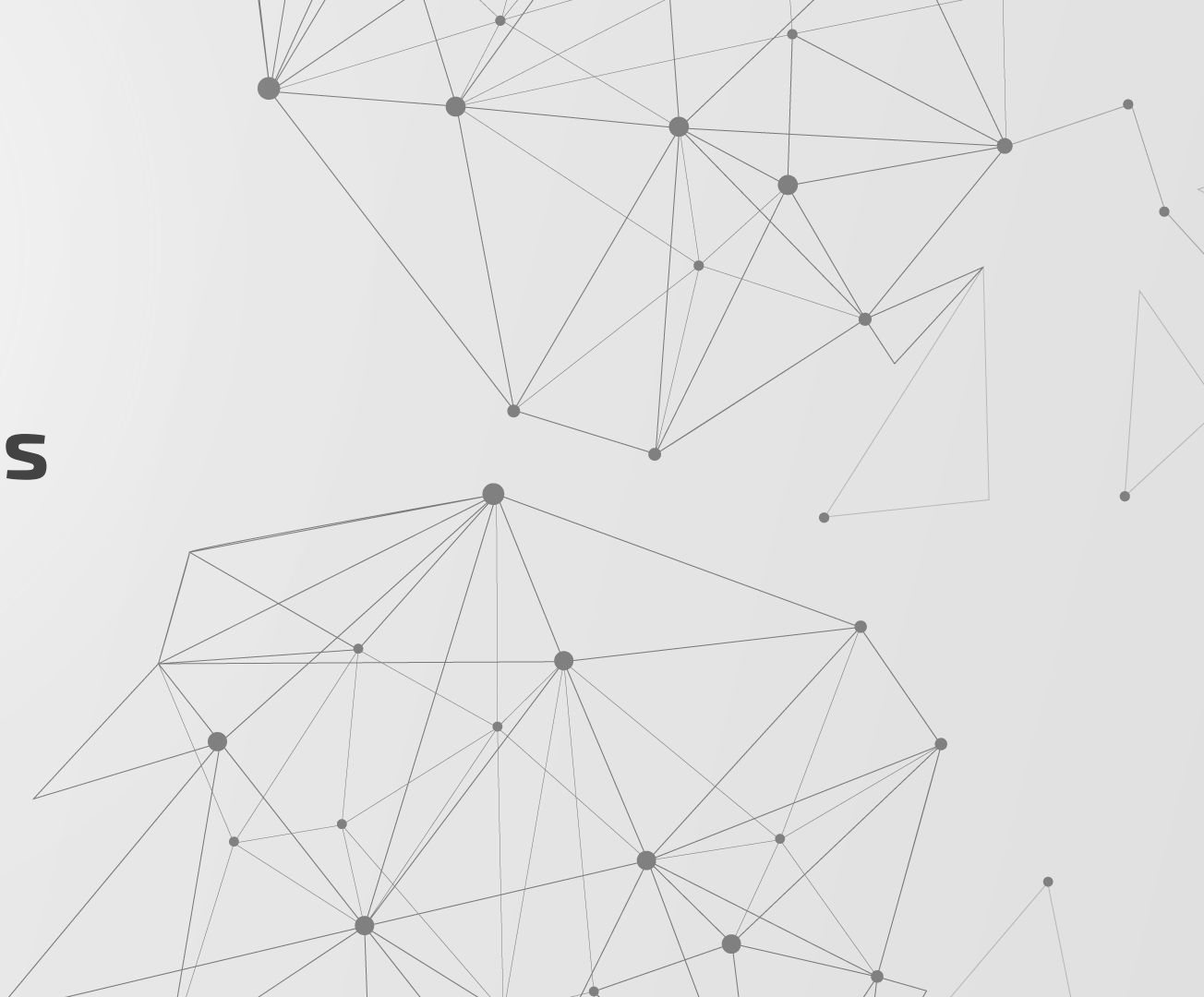
Analysis



Conclusion

04

Methods



Machine Learning Approaches

- **Supervised Learning**
- **Unsupervised Learning**



Classification

a predictive modeling problem where a class label is predicted for a given example of input data.

the most straightforward and frequently practiced clustering method to categorize a dataset into a bunch of k classes

K-mean Clustering



Regression Analysis

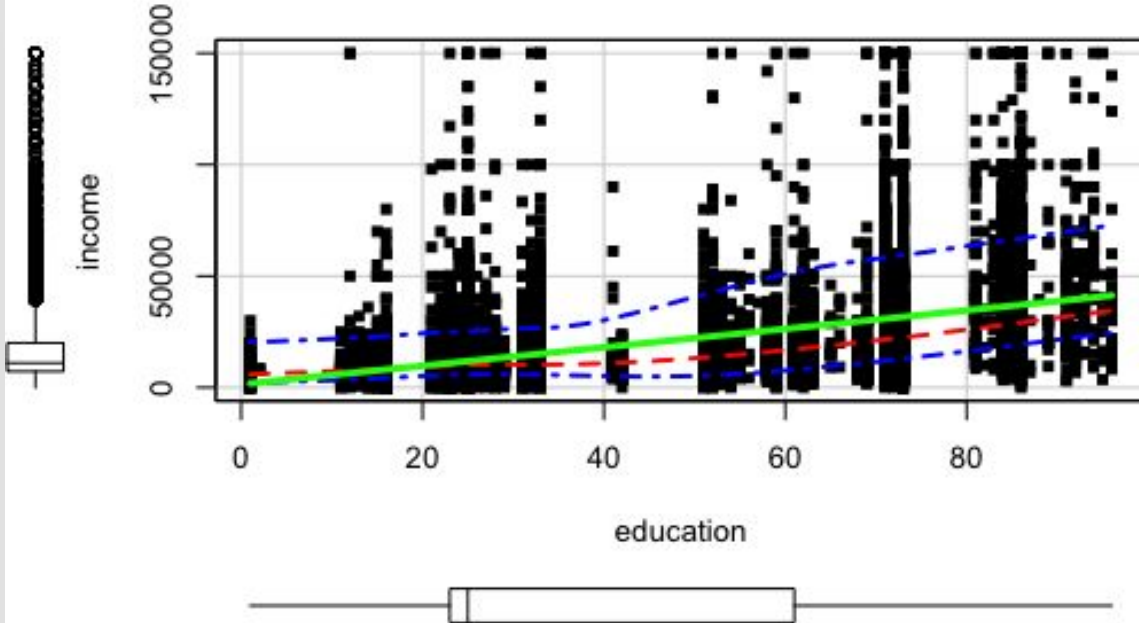
build a mathematical equation that defines y as a function of the x variables.

05

Result



Income and Education Relationship



```
> summary(linearMod)
```

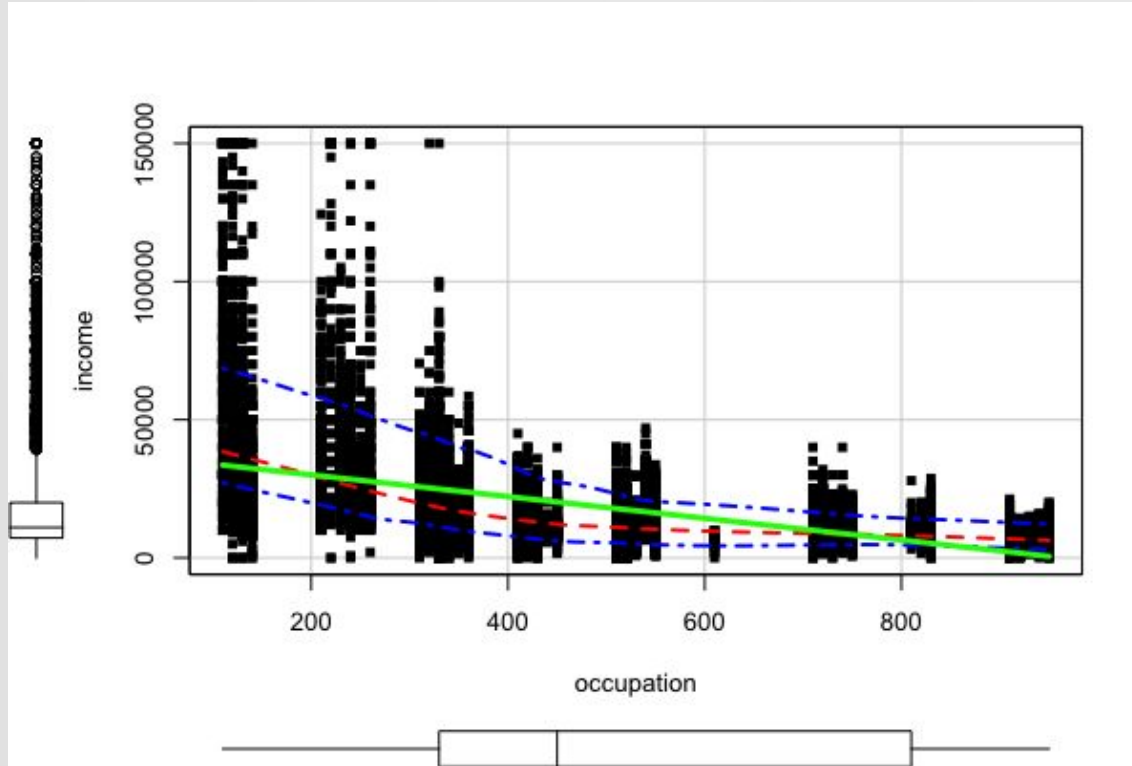
```
Call:
lm(formula = edu$`HKC2011$mearn` ~ edu$`HKC2011$educnh`, data = edu)
```

```
Residuals:
    Min       1Q   Median       3Q      Max
-37306  -7589   -2162    3230  143575
```

```
Coefficients:
            Estimate Std. Error t value Pr(>|t|)
(Intercept)   1443.241    246.755   5.849 5.03e-09 ***
edu$`HKC2011$educnh` 415.187     5.526  75.133 < 2e-16 ***
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
Residual standard error: 17080 on 18061 degrees of freedom
Multiple R-squared:  0.2381,    Adjusted R-squared:  0.2381
F-statistic: 5645 on 1 and 18061 DF,  p-value: < 2.2e-16
```

Income and Occupation Relationship



```
> summary(linearMod2)
```

Call:

```
lm(formula = income_o$`HKC2011$mearn` ~ income_o$`HKC2011$occup`,  
    data = income_o)
```

Residuals:

Min	1Q	Median	3Q	Max
-33192	-10002	-1283	5009	125066

Coefficients:

	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	37910.7191	274.6373	138.04	<2e-16 ***
income_o\$`HKC2011\$occup`	-39.3238	0.4688	-83.88	<2e-16 ***

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 16600 on 18061 degrees of freedom

Multiple R-squared: 0.2804, Adjusted R-squared: 0.2803


F-statistic: 7036 on 1 and 18061 DF, p-value: < 2.2e-16



06

Discussion


Contribution and Limitations



Correlates between monthly income from main employment and educational level

Identify which types of occupation can earn more employment income than others

Utilize several factors to predict the different level of income groups



an accurate statistical measure of a large population can only be obtained when a full list of the entire population to be studied is available.

Possibility of false information
Social desirability effect
Imprecise in the conclusion
Emphasize anonymity

Minor variation in between every individuals
Over-generalised
Misunderstanding the relations



07

Conclusion

Conclusion

- Using computational social science method
 - Investigate monthly income from main employment
 - Investigate where citizens live matter to their employment income
- Still necessary to make use the traditional social science method
 - More completed, logical structure and solution
- Make prediction as much as possible



The background of the slide features a complex, abstract geometric pattern. It consists of numerous thin, light gray lines that connect various points, creating a network-like structure. Some of these points are highlighted as larger, solid dark gray circles, while others are smaller dots. The overall effect is a modern, tech-inspired aesthetic that frames the central text.

THANKS

Does anyone have any questions?

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