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Analysis on the Optimal Choice of Work for High School Students During Holidays

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Abstract: It is very difficult to choose the best job among the many vacation jobs based on our subjective judgments. This article tried to solve this problem by combining mathematics and microeconomics. On the premise of combining personal conditions and job requirements, an analysis model was developed to set two objective functions of maximum net income and maximum additional satisfaction, while the constraint condition was given as well. The model for finding the best vacation job is proposed to help high school students choose the best vacation part-time job.

Keywords: Part-time job; Microeconomics; Dual-objective optimization model

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1. Introduction

With the rapid development of the Internet today, the amount of information about part-time jobs is really too great. The massive amount of part-time job information dazzles us high school students. It is very difficult to choose a favorite job that is suitable and provides a high income. A satisfactory part-time job can not only achieve our expected income, meet our requirements for the working environment and work intensity, but also contribute to our social practice and interpersonal skills enhancement in the long run. Combining the high school students' own situation and personal preferences, we try to use the relevant ideas of microeconomics to analyze this problem, and then build a mathematical model based on the analysis results to solve this problem, so as to help high school students find the best vacation job.

2. Overview of Optimization Selection

First of all, both our own comprehensive quality and personal job preferences aspects were considered. The former facilitates us to know what kind of work we are suitable for, while the latter shows the type of work we want to do. After clarifying our own positioning and personal needs, we continue to consider the factors related to vacation work, such as salary, the distance of the job from home, the certain amount that can be obtained in the recruitment information, and the probability of risk in the job, etc. Then, starting from the basic principle of reasonable allocation of scarce resources in economics to obtain maximum utility [1], we set the maximum total utility as the objective function. In addition, quantifying the extra satisfaction is set as another objective function. Finally, a dual-objective optimization model was constructed to help us find the best vacation job.

3. Own Situation and Preferences

Accurate positioning of our own situation is an important prerequisite for us to choose a vacation job. We

need to determine some indicators to describe it, such as height, weight, age, these quantitative indicators that have constant values over a period of time, as well as qualitative indicators, like work experience and personal professional expertise. Different jobs may have different requirements for the above indicators. For example, when you are engaged in the vacation job of tutoring, you will naturally have higher requirements for expression and knowledge, while porters, waiters and other jobs may be restricted to height and weight.

Own preferences determine what work we want to do. It is most directly reflected in income, working hours, etc. After all, everyone wants to invest less time to get more compensation. In addition, we certainly hope to spend our spare time on the physical exercise, entertain, or socialize. These activities will bring us satisfaction in other aspects, so own preferences will also be reflected in the vague amount of work style, work environment, and distance between the work place and home.

4. Indicators of Work

After considering our own factors and personal preferences, we need to consider work-related factors. These factors should include total salary, hourly wages, average daily workload, additional expenses incurred during the work (board and lodging expenses and transportation expenses), etc. The higher the hourly salary is, the more efficient we are to make money. In addition, we need to consider the additional costs incurred during the work process. For the risks arising from work, we choose the area of the one-standard deviation interval and the two-standard deviation interval to measure the low-risk work and high-risk work, their risk rates are 0.27% and 5.5%, respectively. In most cases, outdoor work is obviously more risky than indoor work, and the farther away you live, the more you risk.

5. Building Optimization Model

5.1. Constraint condition

For the constraints of the optimization model, since there are only 24 hours a day, the first constraint is that the daily work, rest and leisure time should be equal to 24 hours, and the working time should be greater than 0 and less than 24 hours minus minimum rest time; the second constraint is that the hourly wage should be greater than or equal to our expected value; the third constraint is that the total number of working days should be less than or equal to our expected value.

5.2. Objective function

We only have 24 hours a day. Excluding our own sleep time, we can devote the remaining time to work and other activities separately. Every hour of work will bring us money in return, and spending an hour on other activities will bring us satisfaction in other aspects. The benefits of the former can be described by hourly wages. According to the above analysis, we can use the personal expected rime value to measure the latter. In addition, we also hope to minimize the cost of accommodation and transportation during the work process. Taking into account the risks that may occur in the work, we can get the first objective function of the planning model, which is the money we directly obtain. Students provide labor time for economic activities. According to the labor time supply curve in the economic analysis literature [2], we obtain a new objective function and use the amount to quantify the additional satisfaction. Since there are two objective functions, it is difficult to solve directly. We refer to the conversion of multiple objective functions into single objective functions, and introduce a coefficient of 0.5 to combine these two objective functions.

5.3. Model expression

$$Max: f(Hr,Td,Wt)*0.5+g(Hr,Td,Wt)*0.5$$

$$f(Hr,Td,Wt)=Max:(1-Rr)*\left[Hr*Wt+Etv*Dt-(Te+Ae+Me)\right]*Td$$

$$g(Hr,Td,Wt)=Max:(Hr-Etv)(Wt-Ewt)*Td$$

$$s.t.\begin{cases} Dt+Se+Wt=24 \\ 0<Dt\leqslant 24-Se \\ 0<Wt\leqslant 24-Se \\ Ehr\leqslant Hr \\ 0<Td\leqslant Ewd \end{cases}$$

Where, Dt is daily time for other activities; Se is average daily sleep time; Wt is Daily working hour; Td is total working days; Me is average daily meal expenses; Te is average daily transportation expenses; Ae is average daily accommodation expenses; Hr is hourly rate; Tr is total revenue; Rr is risk rate in the work; Ehr is personal expected hourly rate; Ewt is personal expected daily working hour; Ewd is personal expected working days; Etv is personal expected time value; Etr is personal expected total revenue.

6. Application

The usage of the optimization model is as follows: First, input personal preference aggregate, personal information aggregate, all work requirements aggregate and all work information aggregate.

Then, screen according to judgment and screening criteria. Finally, the relevant data of middle school students and the work data after the screening are brought into the following model to get the job that maximizes the objective function value. It is the best job we are looking for.

7. Conclusion

This article comprehensively analyzes the problem of middle school students' choice of vacation jobs, and establishes an optimization model combining mathematics and microeconomics. This model takes into account the students' own situation and finds the jobs that students can complete and are willing to engage in. Then the relevant recruitment information for these jobs, such as total income, hourly salary, location, etc. are brought into the two objective functions, so as to help students find the job with the highest satisfaction and net income.

Disclosure statement

The author declares no conflict of interest.

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