
Comparative Study of University and Polytechnic Graduates in Finland: implications of higher education on earnings

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ABSTRACT This study explores the implications of higher education on earnings in Finland. The challenges as well as opportunities of obtaining a university degree as compared to graduating from polytechnics are evaluated using the REFLEX (The Flexible Professional in the Knowledge Society) data. As a Nordic country, Finland is known for its educated population and the public emphasis on continuous learning but, nevertheless, there has been comparatively little research published internationally. The authors address the criticisms and drawbacks of higher education by analysing the performance of Finnish graduates in the labour market using the analysis of covariances. While debates concerning additional financing for higher education persist, it is acknowledged to be one of the solutions to the ageing population and related economic problems in Finland. Based on the results from various Finnish educational institutions, the authors analyse the degree of match between investment in human capital and market demand.

Introduction

While the role higher education plays in a knowledge economy has been previously studied from various perspectives – examples include Hare and Ulph (1979) and Barr (1993) – the approach has been rather generic. Our goal in this study is to evaluate the correspondence of higher education to the demand in the labour market on a national basis through data analysis using the well-known REFLEX (The Flexible Professional in the Knowledge Society) survey data. As a Nordic country, Finland is known for its educated population and the public emphasis on continuous learning but, nevertheless, there has been little research published internationally, especially on the topic of educational economics (see, for example, Uusitalo, 1999; Antikainen & Kauppila, 2002). Consequently, we are interested in studying the relation of higher education and its rate of return in Finland.

In the 1980s, the Finnish government became more involved with the development of its national economy, as well as the well-being of its citizens. Higher education was one of the focus areas of investment (Honkanen, 2010). By higher education we mean the transmission of knowledge, skills and values that foster creativity, expertise and competence within the population from one generation to the next (Rothschild & Lawrence, 1995). Higher education is crucial for the Finnish economy since it acts as one of the solutions to the age-structure problems in Finland. Nevertheless, we need to understand the role taken by higher education that balances the rate of return with that of its costs. Specifically, our present study will discuss the match of higher education and work demand in terms of earnings.

Cost-benefit analyses of investment in higher education date back to the 1970s by researchers like Psacharopoulos (1981). The costs of higher education include the opportunity cost and the cost of the physical and social capital of learning. Generally, government subsidies to higher education have increased private returns (Barham et al, 2005). It is also shown by the research work done by Chou and Lau (1987) that the technical efficiency of higher education increases economic productivity, and this is reflected in the real growth in gross domestic product. Likewise, our research aims to assess the quality of higher education through a comparative study of the performance of university and polytechnic graduates in terms of the demand of work life.

In summary, the primary aim of this study is to analyse the correspondence between higher education and the demand of the labour market in terms of financial returns using the REFLEX data. The contribution of this study is to highlight the implications of investment in higher education as the solution to the economic problems in Finland. Specifically, our study seeks answers to the following research questions:

- Taking the field of study and gender into account, how do the earnings of university graduates compare to those of polytechnic graduates?
- How does the demand of work reflect the skills learned in schools?
- In what kind of industrial environments do graduates operate in terms of the level of competition?

Consequently, we will be drawing on empirical analysis on the rate of return of education on a national level in the hope of advancing our understanding of the concept of higher education in a developed country.

The article is organised as follows: we will first address the importance of this subject by drawing on the properties of the Finnish economy that require the analysis of higher education in terms of its impact on the development of the Finnish economy – that is, we need to understand the differences in the performance of university and polytechnic graduates in order to justify increasing investments to higher education. Thereafter, we will discuss the quality of the data used in this study as well as the methods. The results section describes the output of our study. We will also evaluate the reliability of our results. Finally, the discussion and conclusion section will close the article by outlining the implications of our results for policy makers in Finland.

Higher Education in a Knowledge Economy

Finland, having a knowledge-based economy, puts great value on know-how and expertise, which are critical economic resources that can be managed to produce useful economic outputs (Antikainen & Kauppila, 2002). Knowledge from higher education can be both an asset and a service that can be used to generate high-value returns (Cohn, 1992). Consequently, the majority of the highly educated in Finland are employed in the job market (Honkanen, 2008). However, while a Master's degree ensures a good position in the job market, earning a polytechnic degree may, in some cases, raise earnings as compared to gaining a Master's degree (Ulph, 1979). One explanation is the reluctance of employers to pay higher wages according to a higher academic degree. Thus, we are interested in studying how the earnings of a university graduate compare to those of a polytechnic graduate taking the different fields of study into consideration.

Despite the intangible benefits of higher education, it is still perceived as a financial investment. Hence, both the individual and the government want to get a return from their investment. The measures for return include employment rate and earnings (Psacharopoulos, 1981). Those who finance higher education want to see a return in their investment, while the benefit of education is not always immediate and certain (Masden, 1995). From the public investment point of view, the return of higher education is partially expressed through tax revenues and a high level of educated workforce in the labour market (Psacharopoulos, 1994). From the private investment point of view, earnings are the key measure for the return of higher education (Uusitalo, 1999). Especially for males, we assume that higher earnings are associated with a higher degree. We will be looking at the effect of gender on earnings in our subsequent analysis in terms of university and polytechnic graduates.

An emphasis on knowledge has been one of the government's focuses in Finland since the 1980s (Honkanen, 2008). Nevertheless, at the same time, the growing risk of economic transitions

and the information surge, together with radical changes in the job market as a result of globalisation and technological advancement, has caused living in such a society to be more insecure, as reflected in long-term unemployment (Dale, 2005). Green et al (2000) found the privatisation of public services, the weakening of social protection and the trend in trade to have contributed to the increasing unpredictability in the job market, as a loss of control over organisational restructuring and increasing workload. Subsequently, we are interested in determining the level of competition in the work environments which both university and polytechnic students face after graduation. In addition, studying the mismatch between education and work demand would complement our understanding of the role of higher education as one of the solutions to the economic problems in Finland.

The knowledge economy in Finland brings with it the challenge of deskilling, where a number of highly educated graduates are employed in professions that require less skill, which often leads to underproductivity and a lower respective income (Murdoch & Paul, 2007). This phenomenon is partially explained by the asymmetric information flow between educational institutions and the job market, and is also present in the Finnish economy. Moreover, many Finnish graduates actually end up working in fields that they did not originally plan or were compelled to re-educate for, for a better future (Ollikainen & Lindholm, 2003). This is because the amount of jobs does not increase even when the level of education increases in the population. The problems of deskilling and mismatch between work and education have also been noted internationally: according to Brown and Hesketh (2006), over 40% of graduates are working in fields that do not require a university degree. Consequently, our present study aims to discover whether increased pressure and demand from the workplace is the primary reason behind the mismatch between education and work for graduates in Finland.

Similarly, Finnish companies have been reducing their workforce due to technological advancements and production changes adopting the so-called post-Fordist production model and flexibility, which has triggered uncertainty in working conditions. While higher education, on average, guaranteed better earnings and stronger possibilities in the job market, the question is now more about finding the right job that matches the skills and education of the graduate. According to research done by Ylöstalo (1999) concerning uncertainty in the job market, a third of the respondents believed in the weakening job market and only 18% expected improvements from the existing conditions. The expectations of Finns were generally rather negative towards the job market. We will show through our analysis of the REFLEX data that, in fact, most graduates have faced employment difficulties. Moreover, both the first and the current job of the graduates seem to demand more than the competences they have learned in schools.

Data and Methods

The REFLEX project was funded by the European Union and was launched in order to assess the European higher education system from the perspective of the modern knowledge society (Allen et al, 2001). There were 16 countries in the REFLEX project: Austria, Belgium, the Czech Republic, Estonia, Finland, France, Germany, Great Britain, Italy, Japan, the Netherlands, Norway, Portugal, Spain, Sweden and Switzerland. The data was collected in 2005, which incorporated graduates from 1999 to 2000, leaving a period of approximately five years in the job market. In this survey, a total of 13,141 graduates responded. Because the data was limited to those in work life, the response rate varied from 18% in Estonia to 60% in Switzerland.

In our study, the focus is on the graduates from Finland. The response rate in Finland averaged 45% of all those who graduated in the year 2000, excluding a few polytechnics. In total, we examine a sample of 2500 respondents who had studied in Finland. Of these, 870 were males, implying a non-uniform gender distribution. On a European level, it is also acknowledged that there are many possible degrees with large national differences in educational systems. However, in Finland, the situation is clearer, since all the respondents had graduated either from polytechnics or with a Master's degree from a university. While the polytechnic degree is not directly comparable on a European level, it consists of three and a half to four and a half years of study, corresponding roughly to a Bachelor degree.

The respondents were asked to evaluate their monthly earnings in their current and first jobs after graduation. At the time of the questionnaire, approximately 3.1% of the male and 4.2% of the female respondents were classified as unemployed and looking for a job. Another 2.9% of the male and 12.4% of the female respondents were found not to be in the labour force at the time. Moreover, 1.4% of the male and 2.0% of the female respondents did not have any job after graduation. To take into account these statistics, the figures for the current job are calculated only for the group of employed respondents and those for the first job are estimated conditionally on having a job after graduation. Finally, the unemployment statistics are calculated for the whole sample, excluding missing answers.

Given that gender and the type of degree both affect earnings, this is partially due to a different distribution of background factors. For example, female respondents have a tendency to work in fields with lower average salaries. In order to assess whether such factors might explain the differences in earnings, we have used analysis of covariance with age, field of study coding using ISCED (the International Standard Classification of Education developed and used the the OECD and Eurostat) and average total working hours per week as covariates. Then, we have estimated the effect of the type of degree and gender on the mean logarithmic earnings in order to discover whether gaining a university degree offers an advantage in the job market. We will now explain the basic structure of the model.

Generally, in order to study the effect of gender and the type of degree on logarithmic earnings, a common choice is a two-way analysis of variance (ANOVA), which estimates average logarithmic monthly earnings for each combination of gender and degree. Then, the effect of these two variables is estimated to find the impact of gender and the type of degree on earnings. The individual effect describes how changing a variable affects the conditional mean if the other variable is not fixed. For example, in terms of gender, we get a coefficient that describes the effect of being a female on the conditional average without making the distinction between the different types of degree. However, the joint effect should also be analysed. For example, a non-zero joint effect would be observed if the type of degree varies according to the gender of the respondent. As a hypothetical example, it might be that male university graduates have more of an advantage over female university graduates in comparison to the respective differences between male and female graduates from polytechnics.

ANOVA does not fix background factors such as the field of the respondent, which might bias the estimation model towards non-causal conclusions. In order to fix the background factors, we have chosen to conduct a two-way ANOVA for respondents with a similar age, field of study and average total working hours in order to assess the effect of gender and the type of degree of the respondents with a similar background. Analysis of covariance (ANCOVA) essentially performs this task by modelling the effects with a linear model, consequently merging ANOVA and linear regression together. Subsequently, we get similar results as ANOVA, and this method also provides weights for the background variables (age, field of study and working hours). The model is specified in Equation 1:

$$\log y = w_g I_g + w_d I_d + w_{d,g} I_d I_g + \mathbf{w}_{bg} \mathbf{Z}_{bg}$$

The monthly earnings of the respondent are denoted by y and \mathbf{Z}_{bg} is a vector containing the background variables and the intercept term. The variable I_g takes the value 1 if the gender of the respondent is male and 0 otherwise. I_d is 1 if the respondent has a polytechnic degree and 0 in the case of a university degree. The product of the two variables corresponds to the joint effect. ANCOVA estimates the weights ($w_g, w_d, w_{d,g}, \mathbf{w}_{bg}$) together with confidence intervals, which can be used to test the presence of the joint and individual effects.

Results

We have estimated the average current total earnings and those at the beginning of the first job, together with the standard errors of the estimates in parentheses. The results are shown in Table I. The statistics indicate a highly statistically significant difference between the earnings of males and females in the four categories determined by the type of degree and gender. There seems to be reason for concern, especially with regard to female graduates from polytechnics, who seem to earn much less compared to the other groups. Interestingly, there is also a large difference between

the total and hourly earnings in the first job and in the current occupation. Both graduates from polytechnics and universities exhibit rapid career development, while university graduates seem to have a better starting point in the job market. This supports our initial assumption that higher education has a significant impact on earnings and career success, especially for males. Nevertheless, it is acknowledged that earning a degree from a university takes more time than earning a degree from a polytechnic.

	Male polytechnic graduates	Female polytechnic graduates	Male university graduates	Female university graduates
Current total monthly earnings (euros)	2820 (49)	2076 (40)	3335 (62)	2702 (53)
Total monthly earnings in first job (Euros)	1890 (54)	1482 (27)	2202 (35)	1865 (28)
Hourly earnings in current main job (Euros)	16.40 (0.31)	12.53 (0.19)	19.47 (0.50)	17.28 (0.21)
Hourly earnings in first job (Euros)	11.34 (0.22)	9.33 (0.16)	14.62 (1.21)	13.07 (0.25)
Current total working hours per week	41.43 (0.45)	38.34 (0.32)	41.26 (0.41)	38.47 (0.36)
Regular or contract hours per week in first job	38.10 (0.25)	36.48 (0.23)	36.44 (0.32)	34.16 (0.28)
Percent who have been unemployed at least once	22 (2.2)	50 (1.8)	24 (1.9)	32 (1.6)
Average length of unemployment (months)	7.7 (1.10)	6.4 (0.38)	7.4 (0.95)	6.9 (0.51)

Table I. Mean statistics of current and first jobs with standard errors in parentheses.

We have also measured the percentage of the respondents who report being unemployed and seeking a job at least once after graduation. While the number of unemployed at the time of the survey was comparatively low, the figures indicate that many respondents have had difficulties in staying employed. This reflects a certain level of insecurity in the job market. Again, female graduates from polytechnics perform worse than others in this regard, given that half of them have experienced unemployment at least once during a period of five years. Moreover, those who are unemployed face considerable uncertainty, given that the duration of unemployment after graduation totals between six and eight months on average. Nevertheless, the differences in the duration of unemployment given gender and the type of degree earned are not statistically significant, and hence the female polytechnic graduates do not seem to perform worse than others in this regard. Consequently, coping with the uncertainty in work life depends largely on individual qualities rather than qualifications.

We have fixed the field variables to take the value 0 or 1; if all are 0, then the field is engineering, manufacturing and construction, which serves as the base for the subsequent analysis. Given these conditions, the ANCOVA parameter estimates for monthly earnings with 95% confidence intervals are found in Table II. The effect of graduating from polytechnics serves as the baseline and the effect of the male gender is chosen as the second baseline, according to Equation 1. We can see that the type of degree and gender have statistically significant individual effects because university graduates tend to earn more than polytechnic graduates when the background variables are taken into account. In addition, males tend to have an advantage in comparison to females. The type of degree and gender also have a statistically significant joint effect. Given the confidence intervals, the field variables do influence earnings up to statistical significance. However, because the individual and joint effects of gender and the type of degree are found to be statistically significant, the background variables do not alone explain the variation in earnings. In fact, we can see that possessing a polytechnic degree has a negative effect on earnings when background factors are fixed. As a degree from a polytechnic is comparable to a Bachelor degree

from a university, we have consequently obtained evidence on the positive effect of education on earnings.

	Coefficient	Standard deviation	95% confidence intervals
Type of degree = polytechnic	-0.28	0.031	[-0.34, -0.22]
Gender = male	0.12	0.029	[0.065, 0.18]
Joint effect (polytechnic degree, male)	0.089	0.044	[0.0041, 0.17]
Age	0.0022	0.002	[-0.0016, 0.0061]
Total hours per week	0.019	0.001	[0.017, 0.021]
Education	-0.10	0.048	[-0.20, -0.0075]
Humanities and the arts	-0.22	0.039	[-0.30, -0.15]
Social science, business and law	-0.053	0.031	[-0.11, 0.0084]
Science, mathematics and computing	-0.16	0.041	[-0.24, -0.080]
Agriculture and veterinary	-0.23	0.063	[-0.35, -0.11]
Health and welfare	-0.098	0.037	[-0.17, -0.024]
Services	-0.11	0.061	[-0.23, 0.0093]
Intercept	7.12	0.086	[6.95, 7.29]

Table II. ANCOVA analysis of individual and joint effects of the type of degree and gender.

While significant economic benefits of education are observed, a mere analysis of earnings does not explain the match between education and work. In order to assess the degree of match between the fields of study and work, the respondents were asked to assess how well the field of their degree programme and the fields of their current and first jobs match each other. The relative frequencies of the results are reported in Table III, indicating that a mismatch between the present job and the field of study existed at the time of the questionnaire, but such a mismatch was not a major problem, since only approximately 6% reported a clear mismatch. The columns in Table III indicate a similar distribution of results for polytechnic and university graduates. Again, we have restricted our analysis to those who are employed or have some work experience after graduation.

	Polytechnic graduates, current job	Polytechnic graduates, first job	University graduates, current job	University graduates, first job
Exclusively own field	31 (1.5)	34 (1.6)	33 (1.4)	36 (1.4)
Own or related field	59 (1.6)	56 (1.6)	56 (1.4)	53 (1.4)
Completely different field	4 (0.7)	3 (0.6)	6 (0.7)	6 (0.7)
No particular field	5 (0.7)	6 (0.7)	5 (0.6)	4 (0.6)
No answer	1	1	0	1

Table III. Match between field of study and current job (all figures are percentages; the figures in parentheses represent standard error).

The emergence of a knowledge economy implies higher requirements for professional skills, adding to increasing competition in the workplace. In order to assess the level of competition in the Finnish job market, the respondents were asked to assess on a scale of 1 to 5 the level of competition in the market in which their organisation operates (if applicable). The results are shown in Figure 1. More than half of the university and polytechnic graduates reported strong competition in the market in which their organisation operates. This supports the fact that Finnish graduates face a high level of uncertainty in the job market, as reflected by the competitive environment. Consequently, more skills and knowledge are demanded, which results in a mismatch between the demand from work and the knowledge gained from schools. Such an

outcome is also suggested by Table IV, where the respondents were asked to assess on a scale of 1 to 5 the extent to which their current and first jobs demand more knowledge than that gained from schools. Subsequently, a majority of the respondents reported a lack of skills and knowledge to perform their current tasks. The lack of skills also indicates that the skills learned in universities and polytechnics do not fully correspond to the needs of work life.

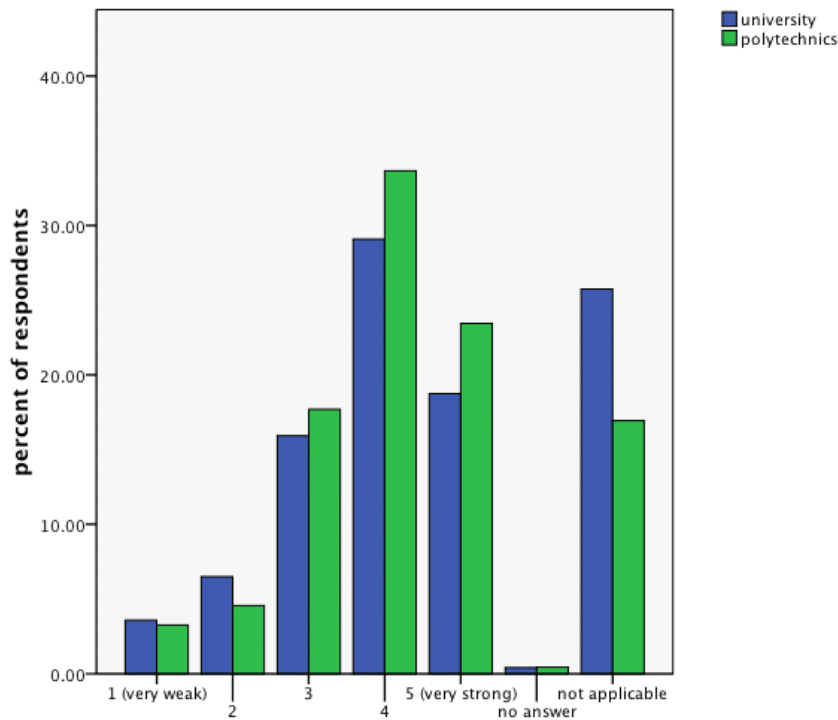


Figure 1. The level of competition in the market in which the organisation of the respondent operates.

	Polytechnic graduates, current job	Polytechnic graduates, first job	University graduates, current job	University graduates, first job
1 (not at all)	1 (0.3)	1 (0.3)	1 (0.2)	1 (0.3)
2	7 (0.8)	12 (1.1)	5 (0.6)	8 (0.8)
3	17 (1.2)	26 (1.4)	13 (1.0)	19 (1.1)
4	39 (1.6)	34 (1.6)	39 (1.4)	35 (1.4)
5 (very high)	36 (1.6)	27 (1.4)	42 (1.4)	36 (1.4)
Missing	0	1	0	1

Table IV. Extent to which the current and first jobs demand more skills than those learned in schools (all figures are percentages; the figures in parentheses represent standard error).

It is acknowledged that the results of our study are affected by selection bias and non-causal effects. In order to control for background variables, we have used the ANCOVA model, which, however, assumes log linearity of the earnings equation. However, our conclusions were made by small *p* values and seem robust against misspecifications. As another source of error, the analysis relies on subjective assessments of the respondents. Yet, currently it is debatable whether other methods of evaluation are superior to data from surveys.

Discussion and Conclusions

Human capital is formulated over a lifetime through informal and formal learning. An individual formulates his or her norms, morals and choices based on the understanding and knowledge learned in schools. Competences and skills are developed by the impacts of education shaping the attitude one faces the world with (Becker, 1962). Subsequently, investment in higher education takes the form of investment in human capital, allowing both quantitative and qualitative changes in economic resources. In terms of a civilised and high-standard society, higher education is indispensable, even in a developed country (Angrist & Alan, 1991). The fact that higher education correlates with increased employment opportunities and earnings, as shown by Table I, suggests that economic prosperity and the general well-being of Finnish citizens have been positively influenced by the knowledge economy.

Despite the fact that the Finnish government has a strong interest in raising employment rates and retaining highly qualified human resources, the challenges of the knowledge economy influence institutional policies on public investment in human capital (Powell & Snellman, 2004). The information age, together with globalisation and technological advancement, has been both a threat and an opportunity for any nation to reconsider its policies in tackling economic challenges, such as the age-structure problem in Finland. As shown by our results in Figure 1, the Finnish economy is also influenced by threats of these global phenomena in the form of increasing uncertainty and competition in the job market. Consequently, higher education institutions in Finland are compelled to design their educational programmes in response to the global demand.

In terms of the quality of higher education, perhaps more emphasis should be put on the practical skills required by the job market, as confirmed by the results in Table IV. While it is necessary to cultivate critical thinking and general skills, the ultimate goal is to equip the graduate with the competences he or she needs at work – this being a criticism of universities as compared to polytechnics in Finland (Honkanen, 2008). Our results in Table III also suggest that over half of the polytechnic and university graduates choose to work in other or related fields to their majors, and hence the competences taught in schools should also reflect this possibility to acquire new or related skills needed in work life. Yet, many companies arrange training for their personnel and encourage them to get certificates so as to ensure their recognition in expertise at work, and hence skills such as analytical thinking and problem-solving skills should be cultivated both in universities and polytechnics.

While our results reveal the fact that higher education does not shield employees from competition and fluctuations in the labour market, it does provide a better chance of survival in the knowledge economy. The possibilities of changing fields and the variety of working tasks, and hence personal choices, are more abundant for those who are highly educated than otherwise. As confirmed by the results in Table II, university graduates, as compared to polytechnic graduates, do seem to earn more given similar working hours and fields of study. If education maximises individual productivity, then the Finnish government does have more of an incentive to invest in such a scheme, simply because the same human capital would generate more tax revenues as associated with higher earnings.

Many Finnish students, given the right to education and freedom of learning, choose to study in polytechnics and begin work earlier, due to a large short-term return. While our results show that polytechnic graduates have similar tendencies to university graduates to change fields, and experience similar pressure from increasing demands of work, it seems that investment in education does produce higher financial rewards, at least in the long term. Graduates from Finnish universities tend to earn more, taking into account the field of study, age and gender. Yet, in the end, a university degree at most offers a gateway to a better future, while actual performance and the long-term impact of education still depend on the individual. Nevertheless, there is a trend towards higher education where professionalism and high earnings are associated with a certain level of degree. This, in turn, offers future research opportunities within the same topic, such as individual learning versus educational institutions and professional training as a substitute for degree programmes.

We conclude that graduates from Finnish universities earn, on average, more than graduates from polytechnics. In terms of gender, women earn less than men, taking the different fields of study into account. As a result of the global phenomena as discussed above, work seems to demand

more skills and knowledge from graduates than the competences learned in schools. The increasing pressure in the labour market is also reflected in the level of competition in which the organisation of the respondent operates.

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