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# *How sensitive are sports fans to unemployment?*

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# How sensitive are sports fans to unemployment?

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**ABSTRACT**
We analyse the attendance of professional football matches in England finding that it is related to unemployment over a very long period of time. More unemployment leads to lower attendances. Distinguishing between leagues, we find that the relationship is larger for lower leagues, i.e. attendances of lower quality football events are more sensitive to fluctuations in unemployment.

**KEYWORDS**
Stadium attendance; football; unemployment

**JEL CLASSIFICATION**
C23; Z21; D12

## I. Introduction

The choice to pay to attend a social event is based on a number of factors. Most primarily, the likely entertainment value provided by the event matters. Equally, however, as with any consumption decision, income constraints must play a role. Sport, and football in particular, is a highly popular activity in the United Kingdom, and hence can be found all around the country. Almost every town has a football stadium, with a team likely playing in one of the country's professional leagues. On any given day, many thousands of fans will attend the matches of such football teams.

Football has long history in England. In October 1863, the Football Association (FA) was established. The principle of professionalism was accepted by the FA in July 1885. Attendance data on football events are available from 1888 onward when the Football League (FL) began. We analyse the extent to which economic conditions in particular influence attendance at such events. Our study aims at investigating whether national unemployment rates affect stadium attendance at the league level. Our focus is guided by the observation that for the period after the second World War football attendance first hit its all-time high whilst unemployment was very low in the postwar rebuild but subsequently achieved its postwar low in the 1980s when the English economy entered its deepest recession. Obviously, the possible relationship between unemployment and football attendance was noted but rarely taken to the test. We exploit the long history of attendance being recorded and the depth of the structure of these events, looking at the many competitions taking place in England over the years. As most competitions are hierarchical, this allows us to consider the different quality of sporting events on offer.

## II. Background

Attendance at sporting events has been very commonly studied; not least because data on attendance numbers are widely published. Studies on football stadium attendance vary in the type of data used in the analysis: match club-level, seasonal club-level and seasonal league-level. Each type of study may investigate different potential determinants. When analysing match-level data potential determinants are loss aversion, quality of the opponent, weather conditions, recent performance of the home team, home advantage and the possibility to win a prize (championship, qualifying for a European tournament) or avoid relegation. When seasonal averages are used at the club level, many match-specific determinants disappear since they cancel out or become irrelevant. If seasonal averages at the league level are analysed the focus can be on socioeconomic determinants, cultural developments and changes in the football industry like increased televising of matches.

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Only a few studies investigate the relationship between economic conditions and stadium attendance. These studies mostly investigate cross-regional variation in unemployment rates with sometimes the peculiar finding of a positive relationship between unemployment and stadium attendance (Baimbridge, Cameron, and Dawson (1996)) which is attributed to spurious correlation of more popular clubs being located in high unemployment areas. Long-term studies using seasonal attendance data do not always capture the effects of changing economic conditions. Dobson and Goddard (1995) for example analyse stadium attendance for professional football in England and Wales over a period of more 65 years. They are interested in the distribution of attendances between clubs eliminating calendar time effects by standardizing attendances for every season. Similarly, Reade (2020) analyzes 130 years of match-level attendances from English football removing cyclical information by introducing seasonal-fixed effects.

Unemployment may have a direct effect on stadium attendance because football supporters who lose their job will have less money to spend. Furthermore, unemployment is a well-known indicator for cyclical fluctuations in the economy. Therefore, unemployment as an explanatory variable will also capture the effects of declining real wages and fears of future job loss accompanied by reduced consumer spending. This may affect stadium attendance since a ticket, especially a seasonal ticket, may be a relatively big expenditure. There are two studies that explicitly focus on the relationship between unemployment and stadium attendance. Van Ours (2021) considers a number of top European leagues, including the Premier League in England. Analysing data from the early 1960s to the late 2010s, he finds evidence of a strong negative relationship between attendance and unemployment. Buraimo, Simmons, and Migali (2021) consider lower league English football in and around the Financial Crisis and Great Recession, finding that attendances in these leagues went down substantially.

By focusing on unemployment, we ignore several potential determinants of long-term stadium attendances such as admission prices (Dobson and Goddard (2001)), hooliganism (Jewell, Simmons, and Szymanski (2014)), renovation and expansion of stadiums (Jakar and Szymanski (2021)), changing composition of stadium crowds (Malcolm, Jones, and Waddington (2000)). Nevertheless, none of these potential determinants can explain the cyclical variations in stadium attendance while as we will show variations in national unemployment go a long way in explaining fluctuations in average attendances at the league level.

## III. Data and methodology

### *Data*

Our data are collected from two sources. We use attendance data from the website 11v11, and we collect unemployment data from the Bank of England's 'Millennium of Macroeconomic Data' dataset. The developments of average attendances per season in English football since 1888 are presented in Figure 1. Clearly, in the Premier League, there are substantial fluctuations over time.[1] From the late $19^{th}$ century, there is an increase in average attendance up to the First World War. After the Second World War initially attendances are substantially higher than in the inter-war period but after that there is a steady decline up to the mid-1980s. From the late 1980s onward, there is a strong increase in stadium attendance. These main developments are present also for lower league though less pronounced. Figure 1 also shows the developments in the unemployment rate, which by and large are a mirror image to attendances.

### *Methodology*

We use a simple regression of the log of attendance $A$ in competition $i$ in season $t$ on the log of the unemployment rate $U$ at time $t$[2]

$$log(A_{it}) = \alpha + \beta log(U_t) + e_{it}, \qquad (1)$$

[1]The names of the leagues have changed over time. We uses the current names. We also combine Division 3 North with Division 4, and Division 3 South with Division 3, motivated by the remarkable similarity of the two series before and after the regional distinctions were abandoned in 1959.
[2]Unemployment rates are averages for calendar years. We assume that attendance in season $t/t+1$ is influenced by unemployment in year $t$.:

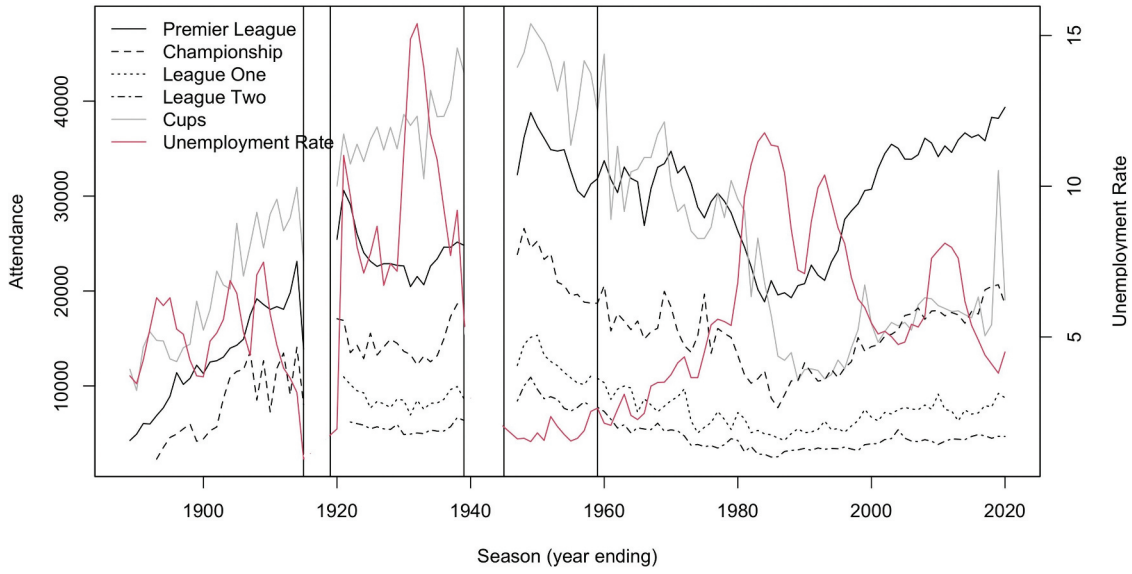


Figure 1. Average attendances per season in English football and the unemployment rate; 1888/89-2018/19.

While appealing on an intuitive level, equation (1) may be misspecified. Not least, attendances from Figure 1 have strong serial dependence, but in addition, it may be that also the unemployment rate is non-stationary and trending. In Appendix A, we discuss this in more detail presenting evidence that equation (1) represents a cointegrating relationship.

## IV. Results

In panel a of Table 1, we present the results from estimating equation (1) for the Premier League, the Championship and the Cup matches for which we have the longest time series. All coefficients of unemployment are negative and significant (Premier League at a 10% significance level). The coefficient values are decreasing in general with the quality of the football, that is, for the Premier League the coefficient is 0.134, while this is 0.235 for the Championship and 0.253 for Cup matches. Panel b of Table 1 shows parameter estimates for the period from 1921/22 onward for which there is also information about League One and League Two. Now, all parameter estimates are significant at a 1% level where the magnitude for League Two is the largest. As shown in Appendix A, we can consider equation (1) to be the long-run relationship.

Table 1. Parameter estimates of stadium attendance, equation (1).

| | Premier League (1) | Championship (2) | League One (3) | League Two (4) | Cup matches (5) |
|---|---|---|---|---|---|
| a. 1888/89–2019/20 | | | | | |
| $\log(U_t)$ | −0.134* | −0.235*** | | | −0.253*** |
| | (0.072) | (0.065) | | | (0.054) |
| Adjusted $R^2$ | 0.020 | 0.095 | | | 0.106 |
| Observations | 121 | 117 | | | 121 |
| b. 1921/22–2019/20 | | | | | |
| $\log(U_t)$ | −0.226*** | −0.295*** | −0.285*** | −0.366*** | −0.306*** |
| | (0.026) | (0.028) | (0.037) | (0.040) | (0.068) |
| Adjusted $R^2$ | 0.450 | 0.547 | 0.385 | 0.474 | 0.173 |
| Observations | 93 | 93 | 93 | 92 | 93 |

*Note*: $A$ = Attendance, $U$ = Unemployment rate; constants not reported; standard errors in parentheses; *p < 0.10; **p < 0.05; ***p < 0.01

Our model relating stadium attendance to unemployment only is amazingly simple. Therefore, it is likely that not all fluctuations in attendance will be captured. Nevertheless, as shown in Figure 2 the relationship between the actual developments and the predicted stadium attendance according to the long-run relationship (equation 1) is quite strong. Apparently, many of the fluctuations in attendance are driven by fluctuations in unemployment and related socioeconomic developments.

Notably, Cup attendance is too high given the contemporary unemployment rate in the inter-war years, and too low in recent decades. Szymanski (2001) argues that in FA Cup matches over time competitive balance dropped

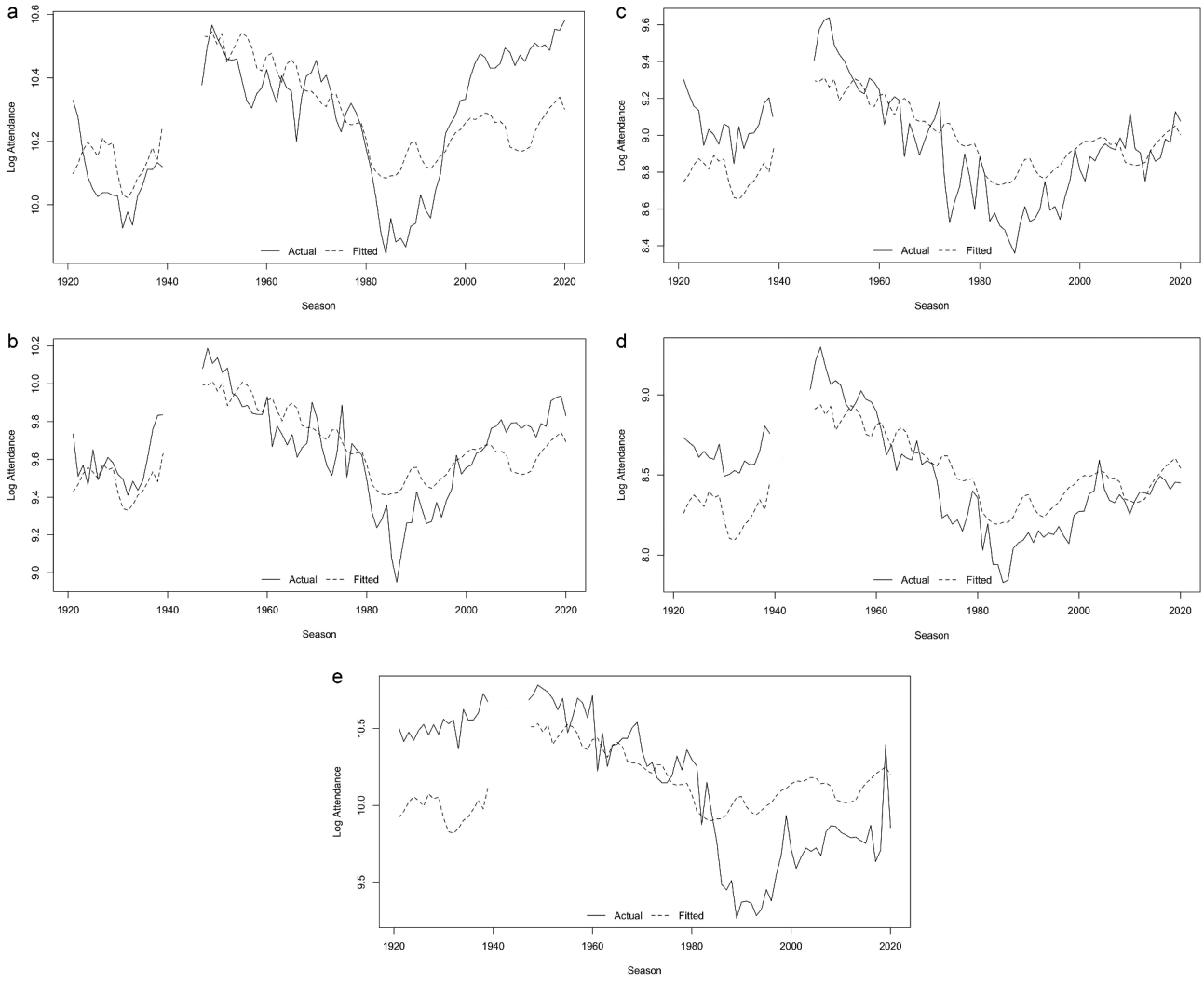


**Figure 2.** Predicted and actual developments in attendance; 1921/22-2018/19.

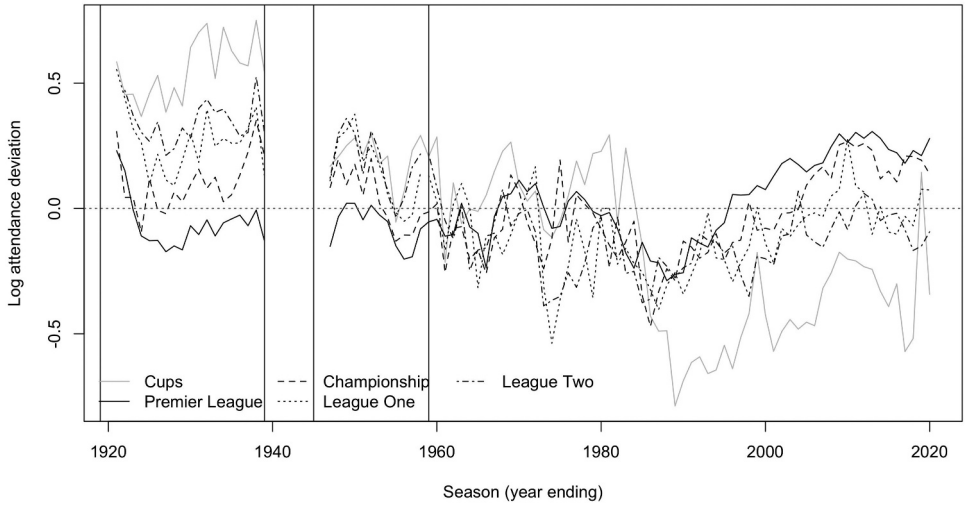


**Figure 3.** Long run relationships between average seasonal attendance in different English football competitions and the unemployment rate; 1920/21-2018/19. *Note*: Vertical axis: residuals = $\log(A_{it}) - \hat{\alpha} - \hat{\beta}.\log(U_t)$.

a lot and therefore stadium attendance decreased. In the second half of the 1960s, attendance was higher than expected. This could be attributed to England winning the World Cup in 1966. In the 1980s attendance was lower than expected given the unemployment rate. This may have to do with the negative attendance effects of hooliganism. Since the late 1990s, Championship attendances have been higher than would be expected given unemployment rates. The same holds in the past decades for attendances of Premier League matches. In the Premier League from about 1995 onward, stadiums were 80% full on average, creeping closer and closer to 100% since. So, there are capacity constraints since around 1995, but not before – even in the nadir in the 1980s, the top stadiums were not much more than half full. To investigate whether capacity constraints affected our main finding, we did separate estimates for the Premier League ignoring data after 2000. Then, we find a parameter estimate of −0.159 which is only slightly different from the estimate presented in Table 1 (−0.134).

## V. Conclusions

We describe a long-run relationship between attendances at social events, football matches, and unemployment conditions. We separate our analysis between different competitions, most of which sit within a hierarchy of quality. With higher quality events, the responsiveness of attendance to unemployment is lower. Clearly, a model with national unemployment rates as the only explanatory variable cannot explain fluctuations in stadium attendance in great detail. Nevertheless, our analysis shows that a simple model can go a long way is describing the sensitivity of sports fans to changing economic circumstances.

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## Disclosure statement

No potential conflict of interest was reported by the authors.

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## Appendix A: Additional estimation results

### A1. Testing unit roots and cointegration

The likelihood of spurious significance (Granger and Newbold, 1974) leads us to add in equation (1) – in the main text – lags of both attendance and the unemployment rate:

$$log(A_{it}) = \alpha_0 + \alpha_1 log(A_{i,t-1}) + \beta_0 log(U_t) + \beta_1 log(U_{t-1}) + \nu_{it}. \quad (2)$$

This revised model can be rearranged to nest equation (1) within it as the long-run relationship:

$$\Delta log(A_{it}) = \beta_0 \Delta log(U_t) + \tilde{\alpha}\big(log(A_{i,t-1}) - \kappa_1 - \kappa_2 log(U_{t-1})\big) + \nu_{it}. \quad (3)$$

Here, $\tilde{\alpha} = \alpha_1 - 1$, $\kappa_1 = \alpha_0/(1-\alpha_1)$ and $\kappa_2 = (\beta_0 + \beta_1)/(1-\alpha_1)$. Commonly, these are estimated via the least squares regression in equation (2) as the estimates are super consistent despite the potential non-stationarity of both variables. This approach is often referred to as the Engle-Granger method (Engle and Granger, 1987).

It allows us to consider both formally via testing, and less formally via graphical plots, the possibility of a long-run relationship between unemployment and football attendance. We are also able to consider the extent to which attendances adjust when this relationship is in disequilibrium, via the $\tilde{\alpha}$ coefficient.

In Panel a of Table A1 we present unit root tests for the unemployment rate and average seasonal attendances for the various competitions and the two periods of analysis. The p-value of the Augmented Dickey-Fuller (Dickey and Fuller, 1979) is presented, and as the null hypothesis is non-stationary, we can conclude that indeed each of these series is non-stationary.

**Table A1.** Unit root testing and cointegration testing.

| | U-rate | Premier League | Championship | League One | League Two | Cup matches |
|---|---|---|---|---|---|---|
| a. Unit Root | | | | | | |
| 1888/89-2018/19 | 0.293 | 0.375 | 0.333 | | | 0.199 |
| 1920/21-2018/19 | 0.163 | 0.182 | 0.697 | 0.525 | 0.476 | 0.313 |
| b. Cointegration | | | | | | |
| 1888/89-2018/19 | | 0.010 | 0.010 | | | 0.010 |
| 1920/21-2018/19 | | 0.026 | 0.049 | 0.010 | 0.010 | 0.010 |

*Note*: Reported are the p-values of the Augmented Dickey-Fuller tests. Panel a shows the unit root test for the separate series; panel b shows the test results for the residuals of regressions for equation (2) presented in Table A2.

**Table A2.** Parameter estimates equation (2).

| | Premier League (1) | Championship (2) | League One (3) | League Two (4) | Cup matches (5) |
|---|---|---|---|---|---|
| a. 1888/89-2018/19 | | | | | |
| $log(A_{t-1})$ | 0.912*** | 0.809*** | | | 0.696*** |
| | (0.020) | (0.040) | | | (0.062) |
| $log(U_t)$ | 0.112*** | 0.046 | | | 0.097 |
| | (0.034) | (0.058) | | | (0.103) |
| $log(U_{t-1})$ | − 0.143*** | − 0.096 | | | − 0.217** |
| | (0.034) | (0.058) | | | (0.104) |
| | (0.209) | (0.400) | | | (0.655) |
| Adjusted $R^2$ | 0.948 | 0.812 | | | 0.584 |
| Observations | 118 | 113 | | | 118 |
| b. 1920/21-2018/19 | | | | | |
| $log(A_{t-1})$ | 0.844*** | 0.778*** | 0.810*** | 0.911*** | 0.713*** |
| | (0.048) | (0.068) | (0.059) | (0.044) | (0.059) |
| $log(U_t)$ | − 0.033 | − 0.109** | − 0.112* | − 0.155*** | − 0.192* |
| | (0.032) | (0.043) | (0.065) | (0.051) | (0.108) |
| $log(U_{t-1})$ | − 0.014 | 0.042 | 0.054 | 0.128** | 0.048 |
| | (0.031) | (0.043) | (0.063) | (0.050) | (0.109) |
| Adjusted $R^2$ | 0.876 | 0.815 | 0.810 | 0.912 | 0.692 |
| Observations | 93 | 93 | 92 | 91 | 93 |

*Note*: $A$ = Attendance, $U$ = Unemployment rate; constants not reported; standard errors in parentheses; *p < 0.10; **p < 0.05; ***p < 0.01

An important step to making sense of the representation in (3) is to check that the long-run relationship from equation (1) is actually stationary. We check this in Panel b of Table A1, again reporting the p-value from an ADF test. This time the test is carried out on the residuals from the regressions estimated for equation (2) and reported in Table A2. We find that all of these residuals can be concluded to be stationary, as the test rejects in each case at a 1% level of significance.

### A2. Parameter estimates equation (2)

The parameter estimates of (2) are presented in Table A2. The coefficients, being distributed across lags, are harder to interpret here, but the impact of the unemployment rate remains clear, suggesting that the relationship between the two variables is not spurious. Notably, despite the lag of attendance, a highly persistent variable, being included, unemployment remains significant in most regressions.

From equation (3) we understand the long-run relationship between attendance and unemployment, but also the adjustment to disequilibrium in that relationship, represented by $\tilde{\alpha} = \alpha_1 - 1$. The first row of coefficients on panels a and b, $log(A_{t-1})$, gives estimates of $\alpha_1$ and hence $\tilde{\alpha}$. All are negative, as would be expected if attendances adjust to correct for disequilibrium. The adjustment is largest for Cup matches, at $-0.287$, and Championship matches ($-0.222$), and smallest for League Two matches ($-0.089$).

### A3. Comparing predictions and actual developments

In the main text, we present graphs comparing predictions and actual developments. Rather than comparing predictions and actual developments, it can be illustrative to plot the residuals of the long-run relationships through time. Based

on the parameter estimates of panel b of Table A2, this is done in Figure 3. The residuals should be centred around zero, when the two variables are in equilibrium. If positive, it indicates that attendance is too high for a given level of unemployment, whereas if they are negative, then attendance is too low for a given rate of unemployment.

The relationships are all moving around zero.

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