

Journal of the Music & Entertainment Industry Educators Association

Volume 6, Number 1 (2006)

Bruce Ronkin, Editor Northeastern University

Published with Support from



Stochastic Demand and Sound Recording Pricing

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Introduction

The market for sound recordings is often described as a market for hits. This reflects the concentration of sales and revenues in a small number of sound recording title releases. While record companies are multiproduct firms, releasing thousands of new titles per year, demand is difficult to ascertain in advance with the vast majority of new titles representing financial failure. Combined with a life cycle often measured in weeks, this uncertainty undoubtedly impacts release behavior, label-artist contract terms, and pricing. This paper explores sound recording pricing in the presence of uncertain demand and suggests that relatively uniform pricing across all titles, compared to a more dynamic pricing structure, is both more pragmatic and workable. Price rigidity is often a feature in oligopolistic markets, with claims of collusive price fixing and monopoly profits commonplace. The music recording industry has itself been the focus of antitrust litigation (relating, for example, to minimum advertised pricing and payola) suggesting the existence of market power and the potential for collusive behavior. While collusion may partly explain price rigidity in the market for sound recordings, this paper offers an alternative, less sinister motivation for uniform pricing: namely, stochastic demand. The stochastic nature of demand is highlighted by a sales probability distribution (utilizing sales data for 2004) and represented diagrammatically in an elementary price determination model in the presence of uncertain demand and uniform costs. The paper also examines the implications of uncertain demand for a label's profit function in the presence of uniform pricing and the implications of unequal title-specific establishment costs.

Uncertain Demand

A record company is a multi-product firm releasing numerous sound recording titles per time period. Marketing and promotion of artist-specific titles often targets well defined listener demographics (socio-demographic networks). It is within these networks that specific genres of music dominate consumer preferences. Since music is an experience good, radio and television broadcasting are an important means by which record companies communicate new musical forms and titles to consumers. Record companies release multiple titles per time period, which target genre-specific sub-markets and/or the mainstream popular music market. This is akin to brand proliferation and is a response to the demand for variety and, as argued in this paper, the stochastic nature of demand.

The record company allocates a production budget to produce the master recording from which duplicates are manufactured (pressed). This investment is treated as an "advance" to the performing artist and is recouped from artist royalties. Along with the marketing and promotion budget, the recording advance represents the establishment cost for an artist-specific title. Sound recordings display the characteristics of a fashion good, where the product life cycle can be measured in weeks rather than years. Record companies typically apply three price points, each reflecting a title's stage in the life cycle. The full-price point is applied to new releases (growth); the mid-price point is typically applied to titles no longer in the charts (maturity), while the budget-price point is applied to back catalog titles (decline).² The focus of the present analysis is on new releases and thereby, on titles selling at the full-price point. With this contextual background in place, we now explore the characteristics of demand for sound recordings.

Despite the implementation of well-planned and funded marketing and promotion campaigns, many new title releases fail to break even. This results from the unpredictable nature of demand for music.

...the system that produces popular music consists largely of a set of organizations, roles, and processes whose primary goal and motivation is the maximization of profits. Attaining this goal is limited by an aesthetic product (popular music) that is subject to largely unpredictable short-term changes. The inability to anticipate short term trends results partly because of the unpredictability of both aesthetic innovation and the changing taste among culture consumers... (Burnett 1992: 5)

For this reason record company operations have been likened to oil drilling, in which one successful strike covers the cost of all speculative ones (Harris 1992). The unpredictability of demand for a specific title is confirmed by sales data. SoundScan data (in Marcone 2005) reveal that only 41 (0.4%) of the 9,406 titles released by the major record companies (the Majors) in 2004 had sales in excess of one million units. Only one "independent" title release had sales exceeding one million units. Together, these 42 titles earned almost 32% of all sales revenue for new releases. A further 58 titles recorded sales between 500,000 and one million units, 56 of which were released by the Majors. For the Majors, the combined revenue of titles selling over 500,000 units represents around 45% of total revenue, but only 1% of their 9,406 releases. In an earlier piece, Philips analyses financial data supplied by the major record companies and suggests that sales of 400,000 units are required for a new title to be profitable. He cites record company executives who claim that it is a high-risk, lowreturn industry in which around 90% of title releases are financial failures. If we apply this threshold level of sales to the 2004 data, the failure rate would be closer to 95%. However, utilizing a single volume threshold for breakeven, in this case 400,000 units, is problematic as it ignores the considerable variation in establishment costs across titles.

According to one music attorney, this high ratio of failures to successes is the result of inefficient and extravagant practices employed by record companies, citing indiscriminate artist contracts and excessive investment in music videos and independent promotion (Cooper, in Philips 2001: 4) In their defense, record companies point to the unpredictable nature of the demand for sound recordings and argue that changes in consumer tastes are not easy to discern. According to one executive interviewed by Philips, running a record company sometimes feels like working in the emergency ward of a hospital.

The odds are so severely stacked against you. No matter how hard you try, in the end you know from experience that the vast majority won't make it. Every now and then you get lucky. It is not as easy as it looks." (p. 4)

This high failure rate is depicted in figure 1 which presents the SoundScan sales data as a probability distribution. It suggests, for example, that there is a 23% probability that a new release will sell between 100 and

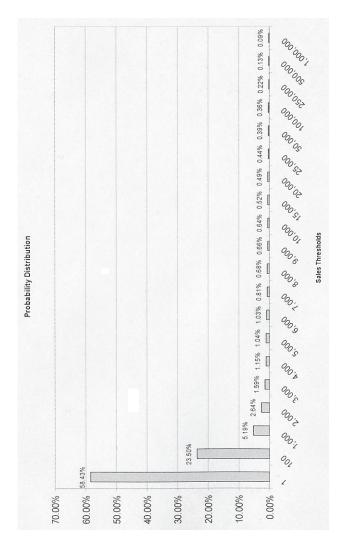


Figure 1. Probability distribution: sound recording sales (majors).

1,000 units, while there is only a 0.22% probability (0.13 + 0.09) of selling over 500,000 units. Figure 1 clearly illustrates the high-risk, low-return faced by record companies investing in new sound recording titles.³

However, this depiction will likely overstate the true risk—return faced by record companies. A factor not considered in the Philips analysis is the variation in title-specific establishment costs, which include recording and mastering, marketing and promotion, video production, and independent promotion. Major record companies do not invest the same amount in each title. This variation in establishment costs and marketing and promotion expenditure causes the breakeven sales volume to vary substantially between titles. It would be erroneous to conclude that 400,000 sales is the benchmark for profitability on all titles. The breakeven level of sales is directly related to the level of investment (title establishment costs) and this will vary between artists on a record company's roster and reflect, among other things, the absolute size of the genre-specific sub-market targeted. Furthermore, for independent record labels, which typically invest smaller amounts in establishment costs, the average breakeven sales volume will likely be lower than that faced by the major record companies.

The foregoing illustrates the considerable demand uncertainty prevailing in the market for sound recordings. New titles with comparable establishment costs and expected sales can inexplicably have quite divergent realized sales.

Uniform Pricing

While the success of a new artist's sound recording is often unpredictable, once successful, a record company has exclusive commercial (monopoly) rights over the reproduction, and often the distribution, of that specific sound recording title. The success of a specific title is measured in terms of sales volumes, with relative success measured by sales thresholds.⁴ Successful titles are ranked in a chart (for example, Top 40 album chart), with a number of charts representing various genres of music. These chart titles generate the vast majority of record company revenues, as demonstrated by the SoundScan data depicted in figure 1. Moreover, demand for these titles is relatively price inelastic.

A majority of customers (excluding those that buy on impulse) will go to retailers with a particular title in mind and will be satisfied with nothing else. If the desired title is unavailable the customer will go elsewhere to make the purchase or perhaps not make the purchase at all (Federal Court 2001).

Indeed, it could be argued that record companies enjoy a temporary monopoly over a hit record. A music enthusiast is unlikely to substitute a sought-after sound recording for a competing title simply because the alternative is offered at a lower price. Rather than compete on price, it is in the interest of each firm to set price so as to maximize industry profit, where a firm's share of this profit would reflect market share. Competition for market share takes the form of product differentiation, where record companies compete to sign artists, expected to create one or more hit records, to exclusive recording contracts. While empirical studies are lacking in this area, the retail sector consensus is that the demand for hit sound recordings is relatively price inelastic (Federal Court 2001). Moreover, the vast majority of sales occur within a very brief window, often coinciding with widespread radio airplay. Individual titles display the characteristics of a fad, where sales increase suddenly and decline almost as quickly. For the record company a "hit record" is a somewhat random and unpredictable event, but when it occurs the company will shift its marketing, promotion, and distribution in support of that specific title.⁵

The stochastic nature of demand for sound recording title releases has important implications for business decision-making, including investment levels and price determination. To account explicitly for the impact of uncertain demand, we have included a stochastic element in the demand function for sound recordings. Let us now consider a profit-maximizing record company in the presence of uncertain demand for a new title where costs are a linear function of output.⁶ While demand is uncertain, record companies can influence consumer preferences via marketing and promotion strategies. Assuming for the moment that each new title has the same establishment cost, record company profit will be determined by the realized strength of demand for a specific title. Expected demand may be depicted as follows:

$$Q_a = a_a + \beta P_i + s_i \tag{1}$$

where Q_e is expected demand for a given range of prices P_i , a_e is the expected absolute market size of the sound recording title, s_i is a variable that measures the stochastic, or random, element of demand, and β measures the marginal response of quantity demanded to a change in price, ceteris paribus. The expected absolute size of a market for an artist-specific title will depend on the size of the genre-specific sub-market within which it is located. We could therefore conceptualize the market for sound recordings as a series of genre-specific sub-markets, each with varying absolute market sizes. New titles may target a genre-specific sub-market, or the mainstream popular music market where titles enjoy more widespread popular appeal. From time to time, titles that target genre-specific sub-markets crossfertilize and attract listeners from other sub-markets. If sufficiently widespread, this phenomenon leads to what is described in the music industry as *crossover*, which itself is a somewhat unpredictable and random event. Titles within the mainstream popular music market often sell well beyond expected sales within a sub-market.

The presence of the stochastic element, s_i , means that record companies face an uncertain demand for artist-specific titles and cannot accurately predict realized demand. Clearly, record companies expect a new title to be successful, or they would not invest time and resources into the production of the sound recording. For the expected demand function to be realized, the stochastic element must be equal to zero. Where $s_i < 0$, realized demand will be less than expected demand and the sound recording title will be a financial failure. Where $s_i > 0$, realized demand will exceed expected demand and the sound recording title will be a financial success.

To illustrate let's assume that the firm sets the profit-maximizing price (P^*) according to the expected demand function (D_E) as depicted in figure 2.7 The expected demand function can be utilized to identify the profit-maximizing price and quantity traded. As a monopoly supplier of an artist-specific sound recording, the record company faces the market demand curve (D_E) for this title. MR is the marginal revenue curve associated with the market demand curve. MC^* is the royalty inclusive marginal cost curve, derived by summing the physical (duplication) cost and the royalty payments made to the artist and songwriter respectively. In the presence of constant marginal costs (MC^*) the average total cost curve (AC) is declining throughout and approaches MC^* for large volumes of output. This reflects the considerable scale economies enjoyed by record companies on hit titles.

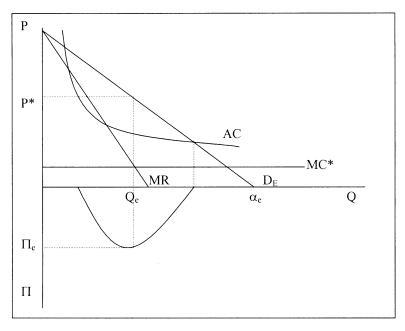


Figure 2. Market for an artist-specific sound recording.

Figure 2 presents the familiar monopoly diagram, where the record company maximizes profit ($P_{\rm e}$) at a price of P^* and a sales volume of $Q_{\rm e}$. If pricing reflects expected demand and profit, then uniform pricing would seem a logical consequence of uncertain demand. To examine this proposition we now consider the impact of uncertain demand on realized demand and profitability.

Realized Demand and Profit with Uniform Pricing

In the presence of uncertain demand, realized sales volumes (and profit) will vary significantly from expected demand. As a multi-product firm the record company will face an array of realized demand curves, the distribution of which will mirror the sales probability distributions presented in figure 1. This uncertain demand, combined with a short product life cycle, makes price adjustments on a title-by-title basis impractical. As before, we presume that record companies set the profit-maximizing selling price according to the expected demand function (D_E) , resulting in a uniform price of P^* across all titles. A uniform price in the presence of

uncertain demand has important implications for profit. Total profit across all title releases will be:

$$\Pi_{i} = (P^{*}.Q_{i}) - (AC_{i}.Q_{i})$$
(2)

where Q_i is the realized demand for the i^{th} title, P^* is the uniform release price, and AC_i is the average cost of the i^{th} title and P_i is profit on the i^{th} title. Collecting terms we obtain:

$$\Pi_i = Q_i \cdot (P^* - AC_i) \tag{3}$$

and

$$\Pi_i = Q_i \cdot \pi_i$$

where π_i is the profit contribution per unit sold. Total profit across all releases is:

$$\Sigma \Pi_i = \Sigma(Q_i \cdot \pi_i) \tag{4}$$

Put simply, total profit is the summation of the product of the profit contribution on the i^{th} title and realized demand for that title. Since P^* is constant and AC is declining throughout, profit per unit increases as sales volumes rise. The convex AC curve, in the presence of a uniform price, produces a concave unit profit function (Π_i) as presented in figure 3. As such, sales maximization equates to profit maximization.

To simplify the illustration we can depict realized demand as falling into four categories: failure $(s_f < 0)$, breakeven $(s_b = 0)$, expected $(s_e > 0)$ and hit $(s_h > s_e)$, and assign average probabilities to each of these categories. This produces four possible demand curves D_f , D_b , D_e , and D_h respectively, depicted in figure 3. The horizontal intercepts a_f , a_b , a_e , and a_h represent the realized absolute size of the market for an artist-specific title. The profit contribution curve presented in figure 3-b depicts the marginal profit $(P^* - AC_i)$ for a given level of realized sales. Titles for which expected demand is realized (D_E) , generate a profit of Q_e , π_e . The breakeven point is reached at Q_b where realized demand is D_b and π_i is zero (where the profit contribution function cuts the quantity axis). For titles with a real-

ized demand of D_f , a loss of Q_f . π_f is incurred. For hit records a profit of Q_h . π_h is generated. For total profit to be positive, we require $\Sigma(Q_y.\pi_y) > \Sigma(Q_x.\pi_x)$ where the subscripts x and y represent titles below and above the breakeven point respectively. Given the probability distribution presented in figure 1, over 90% of new titles will generate sales below the breakeven point. Given this high failure rate, profits generated on successful titles $(Q_x.\pi_x)$ effectively cross-subsidize speculative investment in new titles. Optimal pricing in the presence of uncertain demand, might at first suggest a range of title-specific prices. However, given the firm's inability to predict which of the numerous new titles released will be successful, uniform pricing proves an efficient means of managing this information constraint. Multiple title releases and uniform pricing may therefore be a rational response to uncertain demand.

The illustration presented in figure 3 may help explain the price uniformity observed in the market for sound recordings, argued by some to be the result of an oligopolistic market structure and collusive pricing. The contrary view is that uniform pricing is instead a function of the stochastic nature of demand for a title in which the expected demand function is uniform for all releases. As depicted, price uniformity is the logical strategy in a market with uncertain demand. Given the existence of numerous genrespecific sub-markets, the assumption of uniform expected demand might seem fairly restrictive. However, this model can be applied to an examination of uniform pricing in the presence of stochastic demand and varying levels of investment (establishment costs) for specific titles, the latter reflecting the existence of genre-specific sub-markets of varying sizes. It also proves useful in examining the relationship between a record company and established artists and the phenomenon of crossover.

Uniform Pricing with Unequal Establishment Costs

The earlier assumption of uniform expected demand can be relaxed to explicitly recognize the existence of genre-specific sub-markets of varying sizes. The size of the financial investment in the production and development of a new sound recording title release will reflect the relative size of the sub-market targeted. A range of establishment costs and demand levels, in the presence of uniform pricing has important implications for the shape of the profit contribution function. While varying establishment costs might intuitively suggest a range of optimal prices, this analysis suggests that the optimal price may indeed be uniform.

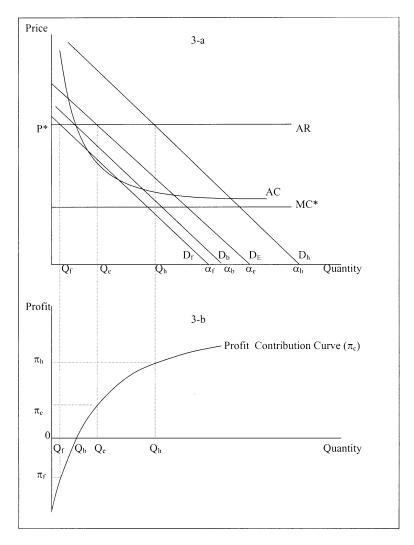


Figure 3. Price and Profit in the Presence of Uncertain Demand.

To illustrate let's consider two new sound recording titles, one targeting a relatively small sub-market (T_1) , while the other (T_2) targets the mainstream popular music market. Establishment costs reflect the relative size of expected demand in each sub-market $(D_1$ and $D_2)$ as depicted in figure 4 by AC_1 and AC_2 respectively. At a uniform price this produces the corresponding marginal profit functions π_1 and π_2 respectively. Not unexpect-

edly, increasing establishment costs lowers the marginal profit function and increases the breakeven volume of sales. If expected demand is realized for each new title, the ensuing profit contribution is π_u . While marginal profit is uniform across titles, total profit is significantly higher for T_2 ; that is $(Q_2.\pi_u) > (Q_1.\pi_u)$. Nonetheless, the illustration suggests that uniform pricing can deliver a uniform rate of return on each investment (title). Assuming that risk levels are uniform between sub-markets, price uniformity may be necessary to ensure the development and promotion of new titles across the range of popular music genres. Lower prices (and unit profits) might otherwise result in an underinvestment in relatively small sub-markets and thereby reduce variety. Accordingly, uniform pricing seems a logical outcome in the market for sound recordings despite the prevalence of varying title-specific establishment costs that reflect varying submarket sizes.

Figure 4 proves useful in investigating two other aspects of the music recording industry: crossover and contract renegotiation by established artists. When a new title marketed within a genre-specific sub-market exhibits the potential to cross over to the mainstream popular music sector, record companies may respond by increasing marketing and promotion expenditure. While this raises the average cost function (let's say somewhere between AC_1 and AC_2) and lowers the marginal profit function, the actual profit contribution can be significantly higher (for example, at a point such as W) as compared to the expected profit contribution (indicated by point X). If the strategy is successful, depicted by a rightward shift in the demand curve from D_1 to D_2 , this provides the record company with a windfall economic profit since (Q_1, W) is significantly larger than (Q_1, X) . Since artist royalty rates are predetermined and numerous costs, including marketing and promotion expenditures, are often recouped from artist royalties, new artists do not necessarily enjoy a proportional share in this unexpected windfall. Established artists, however, are better placed to capture a relatively larger share of this profit.

For the record company, investment in the production of a second or third title for an established artist poses significantly less risk as compared to a title by a new artist. Established artists often negotiate more favorable terms for subsequent albums, which typically takes the form of a higher advance on royalty income and a reduction in recoupable expenses. To illustrate let's assume that D_2 represents realized demand and AC_1 reflects the establishment cost for the first title. A significantly larger recording

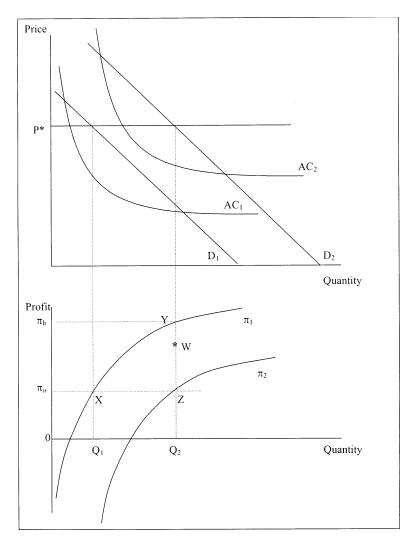


Figure 4. Unequal Establishment Costs for New Title Releases.

advance on a subsequent title can be illustrated as a shift from AC_1 to AC_2 . Rather than generate a unit profit of π_h (point Y) unit profit falls to π_e (point Z). In this way, the established artist captures a larger share of the economic profit generated from the commercial exploitation of the sound recording. However, recording contracts typically cover multiple titles that limit the artist's ability to negotiate more favorable payment terms on the

second or third title. In this way, record companies are able to enjoy a relatively high profit contribution (π_h) on subsequent titles subject to the initial contractual terms and conditions. Attempts to renegotiate contractual arrangements have been referred to by record company executives as "the second album hold-up." For the record company this may still be an attractive proposition, as long as demand is realized (D_2) and the corresponding profit contribution indicated by point Z on π , is achieved. This illustration demonstrates that record companies have the ability to generate significantly higher profits on new artists as compared to established artists. Coupled with the practice of recouping a number of establishment costs from artist royalties, the share of income from successful titles continues to be a point of friction between record companies and artists. In their defense, record companies point to the vast number of unsuccessful titles and the consequential losses that need be recovered. Clearly, the realization of economic profits on a small number of titles is required to crosssubsidize the vast majority of speculative investments that are financially unsuccessful.

Conclusion

Uniform pricing in the wholesale market for sound recordings may be a rational response to the presence of stochastic demand, and not necessarily a function of collusive pricing by oligopolistic firms. Stochastic demand and a relatively short product life cycle combine to ensure that title-specific pricing, based on realized demand, is unworkable for the tens of thousands of new titles released each year. Allowing for unequal title-specific establishment costs, reflecting demand dispersion across genre-specific sub-markets, does not alter this conclusion. While the presence of stochastic demand exposes record companies to considerable risk, it also promises substantial rewards. Profits on the relatively small number of successful titles compensate record companies for the risk inherent in a market in which the majority of titles fail to recover establishment costs. Finally we apply the analytical framework to contract renegotiation by established artists, and the impact on a record company's cost structure and profit margin.

Endnotes

- ¹ The author gratefully acknowledges comments on an earlier draft by Dr. Peter Alhadeff and participants at the Business & Economics Society International Conference (Florence, 2006).
- ² This discussion focuses on record company (or wholesale) prices and not retail pricing. While one can observe considerable price variation at the retail stage, wholesale pricing is relatively uniform. We acknowledge, however, that bulk discounting and discounting of new releases is commonplace (a point made by both Rolston and Alhadeff). Nonetheless, it is our contention that such discounts are applied uniformly (by all labels) and do not therefore amount to price competition at the wholesale stage of distribution.
- ³ For a comprehensive list of sales distribution, both Major and Indie sales volumes, see Marcone, 2005.
- ⁴ In the U.S.A., sales of 500,000 units or more are described as *gold*; while sales of one million units or more are *platinum*. The thresholds for gold and platinum vary between countries and reflect the relative absolute size of the domestic population.
- ⁵ It is important to note that the demand for a new title released by an established artist is more predictable. The present analysis focuses on the uncertainty and risk associated with the development and promotion of titles by new recordings artists. Established artists are considered later in this paper.
- ⁶ Marginal cost consists of the physical duplication cost (which is relatively insignificant at around US\$1) and the artist and songwriter royalties which are fixed by contract or statutory requirement. Marginal cost is therefore assumed to be constant over the relevant range of output. Relaxing this assumption does not alter the analysis.
- 7 Alternatively, D_{E} can be conceptualized as average demand across all titles.
- ⁸ We assume that technology is uniform across record companies and that title-specific establishment costs are uniform.
- ⁹ Differentiating equation (3) with respect to Q_i , we obtain: $d\Pi/dQ_i = P^* AC_i = \pi_c$.
- ¹⁰ Conceptually, figure 3 could depict a genre-specific sub-market or the mainstream popular music market.

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The *MEIEA Journal* provides a scholarly analysis of technological, legal, historical, educational, and business trends within the music industry and is designed as a resource for anyone currently involved or interested in the music industry. Topics include issues that affect music industry education and the music industry such as curriculum design, pedagogy, technological innovation, intellectual property matters, industry-related legislation, arts administration, industry analysis, and historical perspectives. The *MEIEA Journal* is distributed to members of MEIEA, universities, libraries, and individuals concerned with the music industry and music business education.

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The MEIEA Journal (ISSN: 1559-7334)
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