

# Let's Dance ... With Someone Else?

Empirical Evidence on Determinants of Match Separation\*

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## Abstract

In this paper, we contribute to the understandings of different determinants of match separation proposed by matching market theory. We focus particularly on two main causes of match separation: search frictions and initial uncertainty about match quality. For our analysis, we use a unique dataset (records from Czech ballroom dancing competition), which allows us characterize the quality of matches in a neater way than similar studies dedicated to labor and marriage market can achieve. In our particular market of dancers, the performance of the couple is evaluated regularly by referees on competitions in which couples participate, which provides us with a measure of objective match quality and its evolution over time.

We use this measure to identify and describe different causes of match separation. We prove that both prevalent theories of reason for match separation discussed in the theoretical literature, namely search frictions and initial uncertainty about match quality, play a significant role and both of them should be taken into account.

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# 1 Introduction

Over the last forty years, the interest of economists in the issue of the formation and separation of marriages and other types of partnership has been rising, and several theories of search and matching have been developed to describe and model these phenomena. Particular attention has been given to the discussion of reasons for which partnership end, and two competing theories have been developed to explain the phenomenon of match separation. The first theory explains match separation as given by continuous search for a better partner in the situation when the match quality is directly observable. The second theory sees the match separation as caused by the inability to observe the match quality at the beginning of the relationship, but only revealed by experience. In the former case, match quality is said to be a search good, in the latter case, it is considered to be an experience good. For both theories, the match quality is the key element of the model, based on which agents decide whether to enter a relationship, stay together or separate.

Obviously, the two presented cases are extreme, since we cannot assume that the match quality would be a purely search or purely experience good. Therefore, various studies ask which of the two points of view describes better the reality, i.e., to what extent the sub-optimality of a match can be explained by continuous search for a better partner or by initial uncertainty. To find an answer, empirical studies have been conducted over data from labor and marriage markets. These studies have to deal with the question of how to measure the quality of a match, which turns out to be problematic. While in the case of labor market, wage can be to some extent considered as an indicator of match quality, as Mortensen (1988) states, "unfortunately, in the case of marriage, no indicator of match quality seems to exist..." (p. S239). Hence, especially in the case of marriage market, empirical

studies have to use socioeconomic proxies to substitute for the match quality both in the search good and in the experience good sense.

If the case of the marriage is of our primer interest, the question arises whether the socioeconomic effects used as indicators for match quality are sufficient to answer the fundamental question which of the two discussed theories, presence of search costs and initial uncertainty about match quality, explains better the sub-optimality of a match. An ideal way to address this problem is to find a matching market that would contain both: basic characteristics of the marriage market as well as a measure of match quality.

We propose an empirical analysis of the data from Czech ballroom dancing competitions; in this environment, the formation and separation of couples resembles very much to the mechanisms of the marriage market, and at the same time, results from competitions provide a reliable measure of match quality. This is why we believe that our extensive database of the results from competitions in Czech ballroom dancing provides suitable data to analyze the importance of search frictions presence and of initial uncertainty about match quality on the match separation.

## 2 Literature review

The up-to-date empirical literature studies the effects of match separation in two markets: labor and marriage market.

A representative labor market study aiming to answer to what extent the sub-optimality of a match can be explained by search costs or by initial uncertainty was provided by Topel and Ward (1992). The authors study the impact of job experience (in current and all previous jobs) and job tenure on wages and consequently on the duration of job occupation for the first 10 years of workers' career. They claim that

if the match quality is a search good, only job experience should have impact on the wage, whereas if it is an experience good, only job tenure should have impact on the wage. The authors find that both experience and tenure matter for the probability of match separation. Thus, it cannot be said that match quality is purely an experience or purely a search good in the studied context. It has to be said though that Topel and Ward (1992) perform their analysis only on the wage, which they consider to be a measure of the match quality. We think that it is at least questionable to assume that especially during the early stage of workers' career, wage could serve as a perfect measure of match quality, since there is a lot of uncertainty on both sides of the market. In addition, one can argue that wage is rather position specific than worker specific, with wage being determined by the situation on the labor market.

The treatment of match quality presented by Topel and Ward (1992) is in a sharp contrast with marriage market empirical studies devoted to the determinants of divorce. A representative paper in this field is Weiss and Willis (1997), which builds closely on Becker (1973) and Becker et al. (1977). Weiss and Willis consider ex-ante heterogeneous agents whose utility from marriage is given by a production function where the characteristics of the agents enter as inputs together with an unobserved quality of the match. The need to treat the match quality as unobserved represents the main contrast of this study with the one provided by Topel and Ward. Nevertheless, the conclusion with respect to the relevance of determinants of match separation is rather similar, since Weiss and Willis find support for both presented explanation of match sub-optimality in the context of marriage market.

Match quality is treated as unobservable by Brien et al. (2006) as well. While Weiss and Willis (1997) assume match quality to be a composition of the unobserved expected quality of match at the time of marriage and of an i.i.d. shock with zero mean, Brien et al. (2006) employ a more realistic approach and assume that even

though stationary match quality is unobservable at the time of marriage, partners' learn about it through a noisy signal that follows an AR(1) process. The authors find that agents need to learn about potential partners through cohabitation experience, which supports the hypothesis of match quality being an experience good.

A different approach to the determinants of divorce is taken by Kalmijn and Poortman (2006). They explicitly assume match quality to be a search good which could be proxied by indicators like age at the time of marriage, acquaintance period or the degree of homogamy. Alongside the effect of match quality on divorce, Kalmijn and Poortman analyze the effects of wife's employment, financial situation of the household and the presence of children. However, one can argue that while the authors consider match quality to be a search good, the latter three determinants can all be seen as indicators of the match quality in the sense of experience good.

To sum up, it is clear that both theoretical and empirical studies consider match quality to play significant role in partners' decision to marry as well as in the stability of relationship. Unfortunately, as this literature review illustrated, it is very hard if not impossible to observe the match quality on both marriage and labor markets, and thus analyze the importance of search frictions and the initial uncertainty about the quality of the match as possible explanations of match separation.

### **3 Data**

For the purpose of our research, we use the database of results from competitions in Czech ballroom dancing in years 2001 to 2010. While this data is publicly available at the web page of Czech Dance Sport Federation (<http://csts.cz>), it is not in a database format which would allow for straightforward download. On the contrary, the web page containing the data is organized as the standard web page with data

available behind the distinct links. For better understanding of the problem we had to deal with, visit at [http://www.csts.cz/www/vysledky/ukaz\\_soutez.php?vysledky/ukaz\\_soutez.php?key=3000311&vrok=2010](http://www.csts.cz/www/vysledky/ukaz_soutez.php?vysledky/ukaz_soutez.php?key=3000311&vrok=2010).

To obtain the data for the analyzed time period for all participants and competitions, we created an automated program. This program went systematically through the links to competitions, downloading the data into a database form. On average, there are more than 10 such competitions per month, which provides us with an exceptionally rich and detailed dataset. For each competition, the data includes information about all couples that participated, their category, their class and the ranking that they achieved at this competition. Each competition is divided into two disciplines, Standard dances and Latin dances, and the couples compete and are evaluated in the two disciplines separately. Some competitions are of qualification type, which means that couples are also attributed points upon which they are consequently assigned in different performance classes within their age categories. In total, there are 9 age categories and 5 performance classes.

### **3.1 Data Cleaning**

After the download, we checked the data for consistency. First, since it is essential to correctly identify individuals, we checked for the consistency between individuals' names and identification numbers and we corrected for any potential typos and spelling errors. Second, we checked and corrected for any typos in the number of points individuals were awarded throughout the career. The typical mistake was the inconsistency between number of points awarded at the given competition and the sum of the achieved points.

Further, the data contains information about the individuals' club affiliation.

Therefore, we assigned to each club the city, county and region it is located in, which allows us to observe the flow of individuals between geographical units. We used this information to better identify exogenous reasons of match separation (such as moving to a different city).

### **3.2 Data characteristics**

For each couple, the data includes information about their age category and the class in which they compete, the achieved ranking at the competition, the type and the importance of the competition, and finally the affiliation to a dancing club. There are two disciplines, Standard dances and Latin dances, and the couples compete and are evaluated in the two disciplines separately. Some competitions are of qualification type, which means that couples are attributed points upon which they are consequently assigned in different performance classes within their age categories. In fact, results from these particular competitions will be of our interest while trying to construct a measure of match quality based on the achieved results.

In total, there are 9 age categories and 5 performance classes, organized as indicated in Table 1. Thus, for some individuals we are able to observe their progress for several years through several age categories.

Whereas the transition between categories is automatically given by the age of the two partners, the transition between classes is conditioned on the performance of the couple in qualification competitions. What counts there is the number of participations in final round and the number of points that the couple accumulates. The necessary condition to pass to higher category is to achieve 5 participations in final round and 200 points. When a dancing couple separates, the class, the number of points and the number of final rounds in the current class is left to the man and

Category	Age	Class D	Class C	Class B	Class A	Class M
Juvenile I	< 10	Yes	No	No	No	No
Juvenile II	10 – 12	Yes	Yes	No	No	No
Junior I	12 – 14	Yes	Yes	Yes	No	No
Junior II	14 – 16	Yes	Yes	Yes	No	No
Youth	16 – 19	Yes	Yes	Yes	Yes	Yes
Adult	19 – 35	Yes	Yes	Yes	Yes	Yes
Senior I	35 – 45	Yes	Yes	Yes	Yes	Yes
Senior II	45 – 55	Yes	Yes	Yes	Yes	Yes
Senior III	> 55	Yes	Yes	Yes	Yes	Yes

Table 1: Categories and classes

to his potential future partner, whereas the woman has to share these characteristics with her potential future partner.

For the purpose of this paper, our unique dataset allows us to observe the evolution of performance of each couple from its formation to its dissolution, creation of new couples with new partners and their subsequent performance. It is an unbalanced panel containing approximately 150 000 observations (if only Czech couples are taken into account), which allows to control for the tenure of each couple (the time this couple has been dancing together), the experience of each individual (the time he/she has been dancing overall), the joint performance measured by achieved points, the class, the category and the affiliation to a dancing club. In this paper, we focus only on the category of adults, which is to our opinion more heterogenous and still represents some 90 000 observations.

Since the aim of our paper is to evaluate various determinants of match separation, it is most important to show that the data are suitable for this task. Therefore, we present the number of partners that each agent is matched with during his or her dancing career. The distribution of this characteristic is visualized on Figure 1 separately for men and women. As can be seen, even if the number of people who

have only one partner in their dancing career is not negligible, an important share of individuals have two partners or more: this is why we think the rate of match separation in the dataset is sufficiently high to allow us to address the topic of our interest.

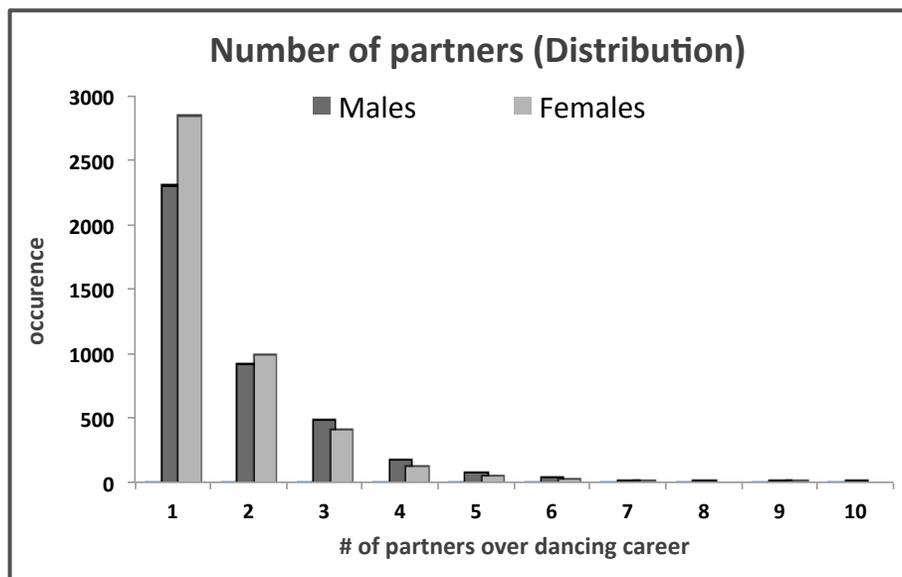


Figure 1: Distribution of Number of Partners Over Dancing Career

## 4 Mesurable characteristics computed from the data

As we have explained in Section 2, theoretical literature distinguishes two main causes of match separation. The first one is an initial uncertainty about the match quality and possible subsequent dissatisfaction with the match. The second one is the presence of search frictions, which may result in not being matched with the most suitable partner right from the beginning and in finding a better partner later on. The aim of this paper is to show that both unsatisfactory realization of match

quality and finding a better partner are relevant causes of match separation, and what characteristics of the match and/or of the two partners play an important role in each of the two scenarios. To do so, we will first explain in this section how we evaluate the characteristics of the match and of the two partners based on our data.

## 4.1 Match quality

Our first task is to evaluate the quality of the match, which is a crucial characteristic determining the satisfaction of the two partners and thus also the stability of the match. In brief, we claim that the key variable which defines the quality of the match for a couple is its performance in dancing competitions. Obviously, we do not rule out the possibility that the two partners may find satisfaction in other attributes of their dancing activity, but since individuals we are studying have self-selected into the pool of participants in dancing competitions, it is not unreasonable to assume that their achievements in the competitions is what they are interested in.

The first raw indicator of performance is the class in which the couple is dancing. Thus we always define couples dancing in higher classes as having higher match quality. Within each class, a more precise indicator of couple's performance is the number of points and the number of achieved finals accumulated at the competitions.

Every time a couple participates in a competition, they are awarded a certain amount of points and they can also gain one participation in the final round. Czech Dance Sport Federation uses an algorithm which states how high the amount of points should be, defined as follows:

$$\# \text{ of points} = DC + 2 \cdot QHR + BON \quad ,$$

where  $DC$  stands for the number of defeated couples,  $QHR$  for the number of qualifi-

cations to higher rounds of the competition and *BON* for the bonus for 1<sup>st</sup>, 2<sup>nd</sup> or 3<sup>rd</sup> place. This shows that the number of points is obviously correlated with final round participation. However, since the necessary condition to pass to higher category is to achieve 5 participations in final round and 200 points, both these characteristics are important and it would be misleading to take only the number of points when assessing the performance of the couple. The importance of both characteristics is further supported by the following observation: when we focus only on couples in adult age group that have satisfied one of the two conditions and are just “waiting” to satisfy the other one to pass to higher class, there are 53% of couples that achieved the limit of 200 points and do not have 5 final round participations yet and 47% of opposite cases.

Since the two characteristics are highly correlated, it is not that clear how to combine them in order to construct a single measure of match quality. After some consideration, we decided that the ultimate goal of each couple is to pass from their current class to a higher one and so the measure of the quality of their match might be expressed as the time they have to wait before they achieve this goal, given their current standing. In technical words, we imagine the match quality to be the expected time remaining before the couple passes to higher class, conditioned on their current number of points and final round participations.

To construct such measure, we compute the time remaining before the couple passes to higher class for those couples who actually manage to pass to higher class, and we regress it on the number of points and final round participations the couple has at that moment. We measure time as the number of competitions rather than real time because the real time can be biased by the number of competitions the couple can participate in for geographical or other reasons. Then we use the estimated coefficients to predict how many additional competitions the couple in question has

to participate in before it passes to higher class. Such a number expresses the average number of competitions remaining, conditioned on the couple’s current number of points and final round participations, which is how we define the quality measure for reasons explained above.

Since only couples who manage to pass to higher class can be used for our estimation, and we have reasons to believe that the performance of these is rather in the upper tail of the distribution, we use for our estimation Heckman’s selection model. In the selection equation (which determines who passes at some moment to higher class and who never achieve this goal), we include variables that reflect the speed at which the couples get to the position they have: current number of points and number of finals both normalized by the number of competitions at which the couple participated so far.

The coefficients from the selection equation are of expected signs and they can be provided upon request. In this paper, only the coefficients from the main equation are displayed. They have to be understood as beta coefficients, because we normalize both points and finals by corresponding standard deviations of these variables for easier comparison.

Table 2 summarizes these beta coefficients separately for Latin and Standard dances and for different classes. All are statistically significant at 1% level except for the coefficients on points for class A in Latin dances. With the exception of class A,

Type	Latin				Standard			
Class	D	C	B	A	D	C	B	A
Points	-3.005	-3.625	-3.636	-0.073	-5.240	-5.591	-5.488	2.039
Finals	-2.750	-2.840	-2.580	-5.106	-1.505	-1.568	-1.081	-5.346

Table 2: Beta coefficients for determinants of time remaining to higher class

the coefficients are rather intuitive. The more points and final round participations

the couple has, the less competitions remain to be attended before achievement of higher class. For class A, we obtain an unexpected positive coefficient for points in Standard dances, but this is because the only class where dancers from class A can pass is the professional class, and maybe not all of them want to really achieve it.

## 4.2 Personal quality

In addition to the match quality discussed in the previous section, each individual can be characterized by his or her personal quality as well. Such personal quality is a crucial criterium in the moment of the formation of the couple, when each individual makes his or her decision according to his/her preferences for the future partner.

Given the structure of our data, where we observe the performance of couples in competitions, we possess unfortunately direct information only about the current joint quality of the couple: the dancers perform in the competition as a couple, and we cannot say if both of them contributed to the result equally or if one of them was better than the other. Hence, the question is how to identify the personal quality of each dancer, how to separate it from the match quality and how to show that this quality can be considered as a signal observable by the potential partners before the couple is formed.

Fortunately, we observe not only the current performance of the couple, but we have also the information about the whole career of each dancer. Among other things, we know in which class each person was when he or she ended the dancing career. We propose the highest class each individual achieved to be the measure of his or her personal quality. This means that rather than evaluating individuals' potential just by their past and present performance, we would look at the whole career and look how far they were able to get.

One obvious advantage of such measure of personal quality is that it is not perfectly correlated between the two partners. Since a large part of people dance with two or more different partners during their career, we observe a significant number of matches where each of the two partners has different highest achieved class - simply because they achieve this highest class later with someone else. And even if this highest class is the same for both partners, for couples that are going to break up this would mean that both partners have the same potential, but this potential is not given by their joint performance (because it is realized while dancing with someone else). Therefore, the highest achieved class allow us to disentangle the performance of the couple from the individual potential at least up to some extent.

Even though the data allows us to observe this measure based on the future performance of the dancers, the question arises whether individuals, when looking for the right match, are able to observe this potential personal quality and even more importantly, whether they make their matching decisions accordingly and in line with the positive assortative matching theory. To answer this question, we analyzed the structure of matches with respect to partners' personal quality defined as the highest achieved class<sup>1</sup>.

In Figure 2, we present two histograms. In the first histogram, all realized matches are represented; in the second one, we omit those matches in which both partners have been matched only with each other throughout their career. Comparing these two histograms, we observe mostly a significant drop in the number of matches when both partners were not able to reach a higher class than D. This suggests that a significant number of matches when both individuals have been matched only with each other are such that the partners found it either difficult to progress or did not

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<sup>1</sup>For conducting this analysis, we omit individuals whose observations are censored due to the end of the observed time period since we believe they did not reach their best class standing yet.

have enough patience and left the market.

But most of all, both histograms show very strong positive assortative matching with respect to personal quality of the partners measured as the highest achieved class.

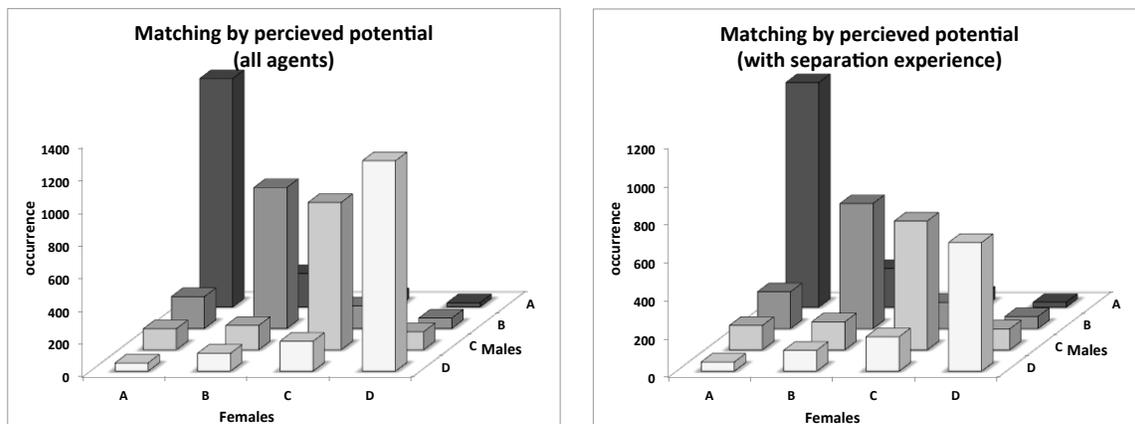


Figure 2: Matching Structure by Highest Achieved Class of Each Partner

This makes us believe that when looking for a match, individuals are indeed able to observe the perceived potential of their future partner and they base their matching decisions on this indicator, i.e., the highest achieved class can be considered as a signal observable before the match is formed.

The strong positive assortative matching presented in Figure 2 is in line with theoretical models of matching markets, e.g. [?], and their predictions about matching structure of partners with heterogeneous personal quality. According to these models, there is a positive assortative matching between agents based on their preferences for the quality of their future partner. The fact that highest achieved class mimic this structure makes us confident that it is a good representation of personal quality as used in theoretical models <sup>2</sup>.

<sup>2</sup>We analyzed the structure of matching with respect to more detailed characteristics than

Unfortunately, defining personal quality only as the highest achieved class of the individual is rather restrictive, because we have only four possible achieved classes and so the evaluation of the dancers in this sense is very rough. Therefore, for purposes of our analysis, we will combine the highest achieved class with other observable characteristics when necessary for more detailed comparison of agents.

## 5 Causes of Match Separations

### 5.1 Identification of Endogenous Causes of Match Separations

The two reasons for breakup that we are focusing on (unsatisfactory realization of match quality and finding a better partner) can be called "endogenous", because they stem directly from the nature of the match. Yet, before we do so, we have first to explain why not all the match separations we observe in our sample are endogenous, and how we proceed to detect only those that we can treat for sure as endogenous.

We have to realize that the career of a dancer is limited and might be ended for some exogenous reasons, i.e., reasons that may not be correlated with the characteristics of the dancer's match. For example, people might stop to dance because they become too old, because they find a time demanding job or because they start a family and they have no time to train and to go to competitions. Such people leave the dancing market and end their matches, even though they might have been previously satisfied with their partner and would not leave him or her for none of the endogenous causes mentioned above. In this case, we talk about an exogenous

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class level ones (number of achieved points, finals, expected time to achievement of higher class). However, we did not observe any sort of assortative matching on such level.

determinant of match separation.

Alternatively, there may be some changes in peoples' lives (related to studies, profession or personal life), that may make the person move to a different city. In that case, he or she would need to break up with his/her dancing partner and either quit the dancing market or find a new match in the new location. We consider such breakup to be exogenous as well.

Evidently, exogenous and endogenous reasons for match separation are not mutually exclusive and sometimes we cannot really separate them in our data. Some people might be more inclined towards ending their dancing career if they are not satisfied in their current match. Some people break up their current match for endogenous reasons and then search for a new partner, but if they are not able to find him (or her), they have to end their dancing career even if originally they did not intend to do so. Therefore, we cannot really say that people who leave the dancing market do so only for exogenous reasons.

On the other hand, we can say that people who stay in the pool of the dancers and within the same geographical region have no exogenous reasons for breaking up, and hence, we can be sure that if we focus only on matches for which both dancers continue their career after being separated and who do not move across regions, we are studying only the endogenous mechanisms of match separation. This is what we are going to do in the rest of our analysis: we exclude all matches where the breakup might be given by exogenous reasons, and we leave only the matches for which we are sure that the cause of separation is endogenous.

Even though the majority of matches end because of one of the exogenous reasons, we are still left with more than 600 matches which we believe ended due to one of the endogenous reasons. Among those, we want to identify what proportion of breakups was given by unsatisfactory match quality which was due to finding a better partner.

Since our data do not state explicitly the cause of separation, this identification is possible only partially. When we see that after separation a new match was formed with better partner, we cannot directly say if finding a better partner was the reason for separation or if it was its lucky coincidence and the separation occurred due to unsatisfactory match quality. On the other hand, if after the separation none of the former partners found a better partner to form a new match, then obviously finding a better partner could not be the reason of the separation, and we can say that such match ended due to unsatisfactory match quality.

For such identification, it is crucial to assess whether a dancer found a "better match" than was the previous one. In the following section, we explain how we define if a dancer found a better new partner and why we can say that it is indeed the reason for leaving the previous match.

### **5.1.1 Finding a better partner**

As explained in section 4.2, we measure the personal quality as the highest achieved class. Since we have only four classes, this leaves us with only four categories of personal quality, which would limit significantly the comparison between dancers. Therefore, when comparing agents, we use our defined personal quality combined with current class standing. In this sense, we define lexicographic preferences of the potential partners. We assume that each dancer will prefer a partner with better highest achieved class, and if he or she has to choose between two partners with the same highest achieved class, he/she will prefer the partner that has a higher actual class. There are interesting implications of this definition of lexicographic preferences that will be discussed in the next section, now it is sufficient to say that intuitively, we find it natural that each dancer would prefer a partner first with higher potential

and second with higher actual standing. Our intuitive expectation is underpinned by Figure 3, where the number of matches formed is visualized with respect to the current class of men and women at the moment of the formation of the couple.

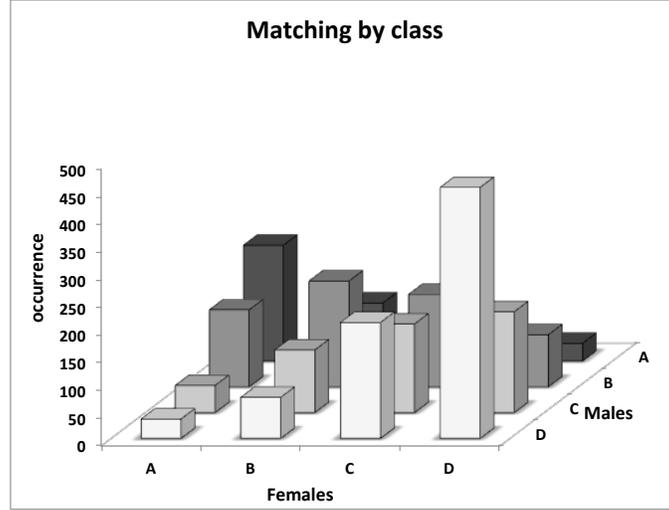


Figure 3: Matching Structure by Current Achieved Class of Each Partner

We observe that a significant number of matches are formed along the diagonal, supporting the positive assortative matching theory. Even if this pattern is not that strong as in Figure 2, where we do the same exercise for the highest achieved class, it suggests that when forming the match, people take into account also the current class standing of their partner, even though it is not as important as his or her observed potential.

Once we made clear how we assess that a new partner is better than the previous one, we have to prove that finding a better partner is indeed a cause of match separation and that it corresponds to the theory of "on the job" search. To provide this evidence, we analyze the individuals' time between the separation and their reappearance in competitions. We assume that this time consists of two periods:

a period of search for a new partner and a period of practicing with the newfound partner before being ready to compete. If finding a better partner is the reason for match separation, the first period (the period of search) should not exist: in such a case, the underlying theory of "on the job search" assumes that the new partner has been found while still being matched. Our hypothesis is therefore that the time to reappearance should be shorter in the case when the individual is matched with a better partner after the separation.

We test this hypothesis within a simple linear regression model: the dependent variable of our regression is the time to reappearance in competitions (measured in days) and the treatment variable is a dummy equal to one if the dancer found a better partner in the new match. Further, we control for personal quality of the dancer as well as his new partner to be able to rule out the possibility that the period of practicing is shorter simply because the quality of the dancers is higher (note that both own and partner's personal quality are represented as dummy variables for the highest achieved class). We also include among controls the dummies representing the class in which the couple is going to dance to allow for longer practicing when preparing for a higher and more competitive class, and the number of previous matches of each individual because we believe that people who change partners more often may be more used to practice with somebody new. The results are presented in Table 3 separately for males and females.

From these results, it is clear that on average, individuals who found a better partner than was the former one needed a significantly shorter time to reappear in competitions. This result is consistent for both male and female dancers. The remaining explanatory variables have expected signs; we do not display all the coefficients for practical reasons (too many dummy variables), but they are available upon request. Our test lets us believe that if we observe a better partner is found, it

	Males	Females
Better partner found	-55.252*** (19.572)	-39.080* (22.975)
# of current partner	-8.474*** (3.177)	-3.254 (3.140)
Own personal quality dummies	Yes	Yes
Partner personal quality dummies	Yes	Yes
Class dummies	Yes	Yes
<i>N</i>	2608	2077

Standard errors in parentheses  
\* p<0.10, \*\* p<0.05, \*\*\* p<0.01

Table 3: Effect of finding a better partner on time to reappearing on the competitions is the result of on-the-job searching process and not of a search following the break up, and hence, finding a better partner is a cause for match separation and not its consequence<sup>3</sup>.

Yet, there is one additional remark that should be made here and it concerns our way of comparison of dancers, based on assumed lexicographic preferences. Such definition of preferences has one interesting implication which we will discuss in the following section.

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<sup>3</sup>Obviously, we are aware of the fact that since we are not able to strictly identify the true cause of separation, we might have in our sample people who broke up because of unsatisfactory realization of the match quality and then they found a better partner. These individuals would bias our results, but this bias would only lead to underestimating the effect we are searching for and so if we observe a statistically important difference between people who found a better partner and who did not, our conclusion is still valid.

### 5.1.2 Change of class

Our definition of who is a “better partner” has two components: one of them is stable and one varies over time. The stable component is the personal quality or potential (given by highest achieved class) and the variable one is the actual standing. We added the actual standing to the measure of personal quality to allow for more detailed comparison and because of its clear impact on the matching structure (see again Figure 3), but we have to admit that its variable character is not really in line with traditional models of matching markets, where partners’ characteristics are assumed to be constant over time.

This assumption of the stability of agents’ characteristics seems to be a little restrictive and not realistic; this is what motivated Vozar (2010) to propose a theoretical model where the separation of a match can be explained by a change in characteristics of one or both partners. Since in our data, we clearly observe a characteristic that has a clear impact on the matching structure and is time variant, we have a great opportunity to test formally also the predictions of the model by Vozar (2010), as an addition to our primer goal, i.e. testing of the two traditional theories. The question is thus whether the change of class (in other words, the achievement of a new class) influences the stability of matches.

When inspecting our data, we found that the achievement of a new class has indeed an impact on match stability since a significant share of separations occur right after the couple is awarded new class. This result is graphically represented in Figure 4.

Yet, it has to be discussed what is the cause for separations occurring right after the achievement of the higher class. One can come up with two possible explanations. In the first explanation, the separation really occurred due to the achievement of a

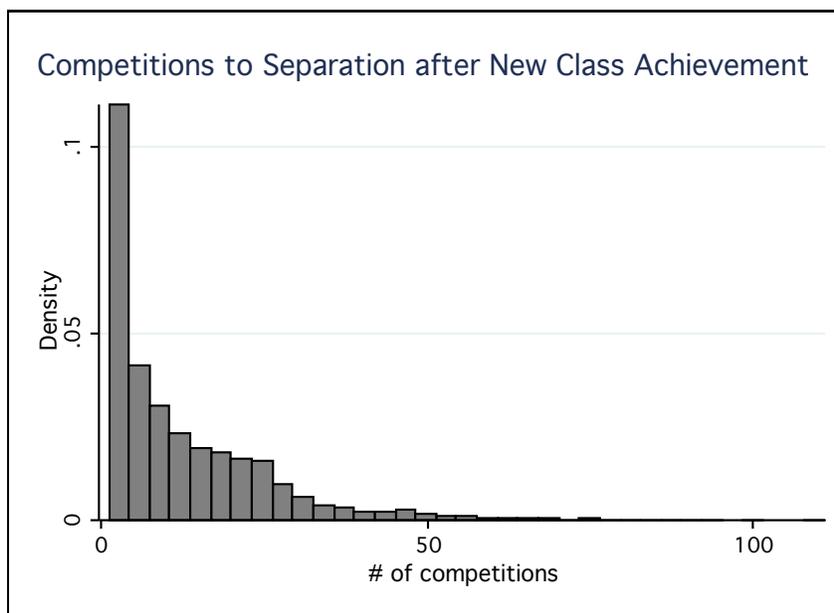


Figure 4: Separation After New Class Achievement

higher class. The intuition is that with higher class achieved, both partners can signal higher personal quality (as explained in section 4.2, current class is one the components of personal quality), and he or she can reach a new pool of potential partners not accessible before. Such separation is in line with the theoretical model proposed by Vozar (2010) and would thus confirm that a change in personal quality may lead to match separation.

In the second explanation, the couple might separate for some other motive, but they decide to postpone the separation till the achievement of a higher class due to various reasons (finishing the job, reaching a milestone together, etc). In that case, the achievement of a higher class could not be considered to be a direct cause of match separation and the theoretical model proposed by Vozar (2010) would not be supported by our data.

To see which of the two potential explanations seems to be more plausible, we

analyze the length of relationship for two different groups of matches. In the first group, we focus on couples that split up just after achieving a higher class. In the second group, we include couples that split up within a class, i.e., not just after the achievement of a higher class. In both groups, both partners find a new match after the separation and continue their dancing career - we eliminate thus people that might be motivated to separate for additional exogenous reasons, as explained earlier. For each group, we compute the average length of the ended relationship, conditional on the class which was achieved to control for potential influence of varying difficulty and level of competition across classes. The results are summarized in Table 4.

Average length	Group 1	Group 2
Class A	<b>15.23</b>	<b>25.12</b>
Class B	<b>14.17</b>	<b>23.02</b>
Class C	<b>12.30</b>	<b>19.39</b>

Table 4: Average length of relationship after controlling for actual class standing

Before we discuss these results, we should explain why the length of a relationship can help us to tell which of the two above presented explanations is valid. If the second explanation was valid, i.e., if separations right after the change of class would be just postponed separations given by other motives, we should expect that the average length of a relationship is longer for Group 1 than for Group 2. If the first explanation was valid, we should observe the opposite: no difference or shorter relationships in Group 1.

The results presented in Table 4 indicate that relationships in Group 1 tend to be shorter than in Group 2. Indeed, when we perform the formal statistical test, we reject the null hypothesis that the average length of relationships is bigger in Group 1 than in Group 2. This finding supports the validity of the theory that changes in partners' characteristics may be an incentive for match separation, at least in cases

where both partners stay on the market after separation. Based on these results, we can conclude that the characteristics of our matching market are in line with the predictions of the theoretical model proposed by Vozar (2010).

This also means that we should not include matches that ended just after the achievement of a new class in our analysis of match separations given by unsatisfactory realization of the match quality or finding a better partner: separations that occurred right after the achievement of a new class might be given by a different factor. This is why we omit such matches from our data as well as all matches that were dissolved for exogenous reasons, which leaves us with 627 couples that will be analyzed further.

We divide these couples who separate for one of the two main endogenous reasons formally into two groups. The first group is such that neither of the two dancers found a new partner that would be better than the current one; for this group, we can say for sure that the cause of separation should be the unsatisfactory realization of the match quality. The second group is such that at least one of the two dancers found a new partner that would be better than the current one; for this group, the cause of separation can be either the unsatisfactory realization of the match quality or search frictions that did not allow to find the best partner in the first place.

We summarize the distribution of the two groups in Figure 5. As can be seen, a significant fraction of couples break up because of unsatisfactory realization of match quality. Those are all in the first group and an unknown part of the second group. The remaining part of the second group is formed by matches that break up because at least one of the dancers has found a better partner. From our previous analysis, we know that finding a better partner is indeed a significant reason for match separation, but this does not mean it had to be the reason for all the matches in second group. In the rest of the paper, we will provide further evidence that for

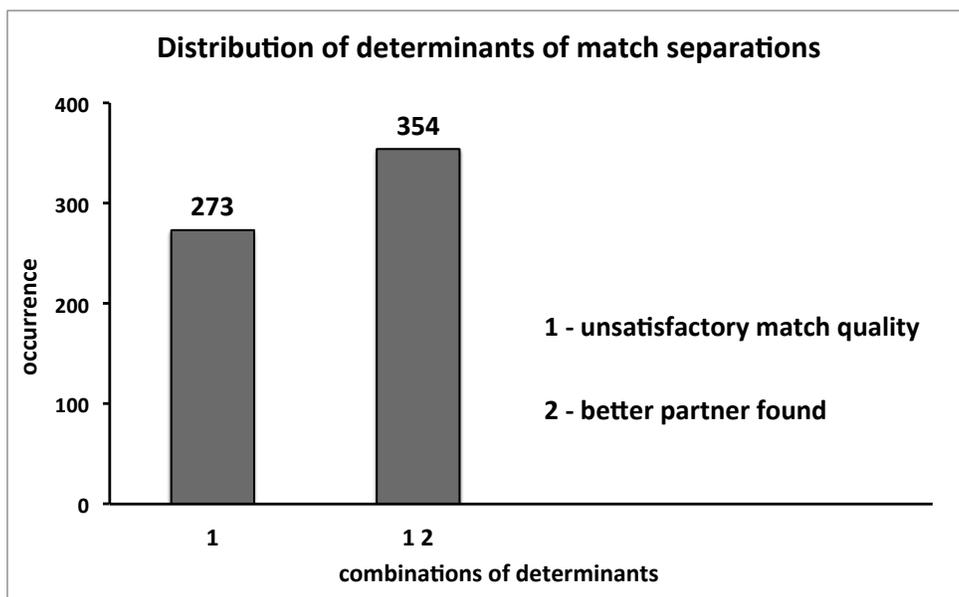


Figure 5: Distribution of determinants of match separations

this group, finding a better partner is not only significant, but also dominant reason for match separation.

### 5.1.3 Stability of the match - basic model

At first, we will show what is the effect of personal and match specific characteristics that we discussed in the previous sections on the hazard of match separation. In particular we use the match quality (expected number of competitions needed to achieve a higher class), the personal quality of both partners and the actual class standings as explanatory variables in a Weibull duration model, which we run separately for each of the two groups of matches. We expect that match quality defined as expected number of competitions needed to achieve a higher class will have a negative effect on the match stability, while personal quality should have a positive effect on match stability. The aim of this basic model is to verify this hypothesis and also to see if

the effects are different for the two groups.

The resulting marginal effects on the predicted median length of relationship can be found in Table 5. Personal quality of the two dancers is represented by dummy variables for the highest achieved class.

		Group 1	Group 2
Match quality		-0.152** (0.068)	0.003 (0.040)
Man personal quality dummies	A	12.864** (5.157)	12.743*** (3.613)
	B	16.993** (7.592)	7.659*** (2.066)
	C	0.471 (3.700)	4.020** (1.557)
Woman personal quality dummies	A	3.296 (4.289)	10.178*** (2.624)
	B	-5.064 (2.986)	8.963*** (2.178)
	C	0.983 (4.305)	7.036*** (2.247)
Current class dummies		Yes	Yes
<i>N</i>		273	354

Standard errors in parentheses

\*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

Table 5: Marginal effects on the predicted median length of relationship

We believe this table is informative in two aspects. First, the coefficient on the match quality is significant only for Group 1 and second, the coefficients for personal quality of women are significant only for Group 2. This indicates that the difference between Group 1 and Group 2 exists; in the following sections, we will explore further the implications of these two findings in order to better understand how they are related to our research question and to develop our model.

#### 5.1.4 Match quality

First, let us discuss the coefficient on the match quality measure, which is significant only for Group 1. For this group, the coefficient is negative, meaning that the better the quality of the match, the longer the relationship and the smaller the hazard of separation<sup>4</sup>. This is completely in line with the theory that sees the match quality as an experience good and that predicts the better the actual realization of the match quality, the more stable the match. Hence, for Group 1, this result is not surprising.

A more interesting question arises when we focus on Group 2: if the coefficient on the match quality is insignificant, does this mean that people in this group do not care about how good their match is? To answer this question, we need to realize that our measure of match quality is the actual realization of the couple's performance, and so it is the match quality in the sense of an experience good. Since for Group 2, we expect also the search frictions to play a role, the coefficient on the match quality being insignificant would mean that our expectation is probably right and match quality can be rather seen as a search good for matches in Group 2. To support this hypothesis and to further highlight the differences between Group 1 and Group 2,

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<sup>4</sup>We have to remember that since our measure of match quality is the expected number of competitions needed to achieve a higher class, the lower the value, the better the quality of the match.

we focus our attention to the coefficients on personal quality of men and women.

### 5.1.5 Personal quality

In Table 5, we see a clear difference between Group 1 and Group 2 with respect to the coefficients on partners' personal qualities. To identify the source of this difference, we looked at the correlation between personal qualities of both partners. We found a very strong correlation of 0.74 between these two characteristics for matches in Group 1. On the other hand, for matches in Group 2, the correlation between personal quality of males and females is only 0.18. We believe that this finding explains the observed non-significancy of the coefficients on woman's personal quality in Group 1. Further, it also motivated us to compare the structure of matching with respect to personal quality of both partners between Groups 1 and 2. The respective histograms for each group can be found in Figure 6. They represent the matching within the old match (the match that is going to be dissolved) by the highest achieved class.

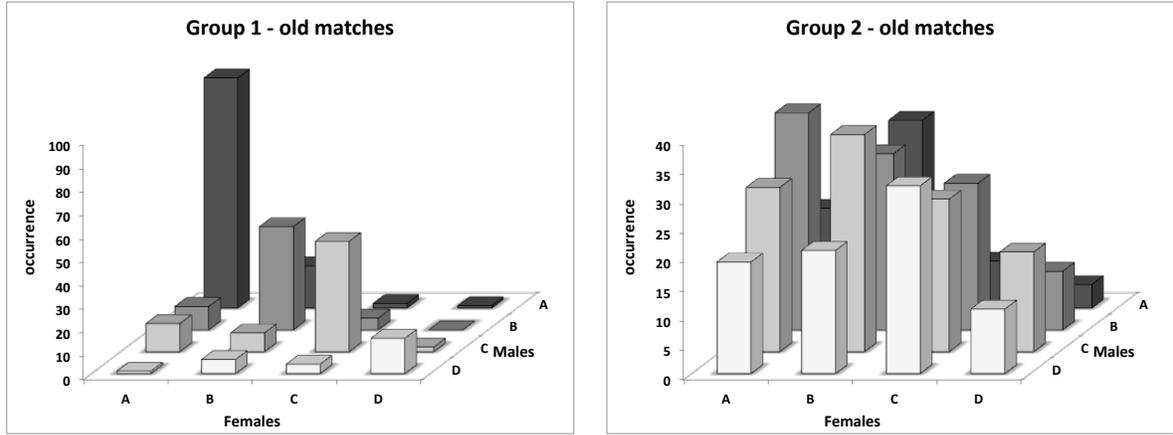


Figure 6: Matching Structure by Highest Achieved Class of Each Partner

As can be seen in this figure, there are clear differences between Group 1 and Group 2. Among those that separated only due to the unsatisfactory match quality,

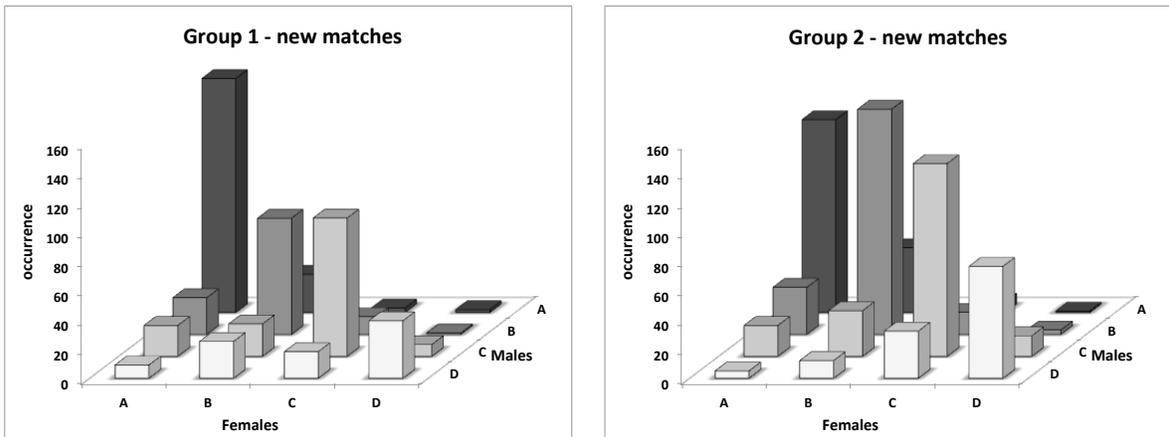


Figure 7: Matching Structure by Highest Achieved Class of Each Partner

there is only a handful of couples outside of the main diagonal. On the other hand, the matching in Group 2 is almost evenly distributed across all possible combinations of personal qualities. This suggests there exists a relationship between the presence of search frictions as a cause of separation and a significant number of "mismatched" couples. To further support this finding, we illustrate in Figure 7 the structure of matches which originate in separations from Group 1 and Group 2.

A comparison of the respective graphs for Group 1 in Figures 6 and 7 shows that the structure of matching remains the same. On the other hand, for Group 2, a clear positive assortative matching structure emerged in Figure 7 as opposed to Figure 6, suggesting that individuals in "mismatched" couples found a more appropriate partner with respect to their personal quality in the next iteration of matching. This result corresponds with the predictions of matching and search models. Most importantly, it strengthens our believe that the presence of the search frictions is a dominant cause of separation for matches in Group 2.

### 5.1.6 Stability of the match - extended model

So far, we could observe that Group 1 and Group 2 represent fundamentally different matches. We have to keep in mind that, as explained earlier, our ability to distinguish the reason of the breakup to be the unsatisfactory realization of the match quality or the presence of search frictions is limited and the division of the two groups may not be exact in all cases, but our results confirm that overall it is very good. In the first group, matches are formed mostly between partners of comparable quality and the stability of the match is influenced mainly by the current realization of the match quality, suggesting that in this group, the match quality in the sense of an experience good plays an important role. In the second group, we observe a very high proportion of mismatched couples in terms of their personal quality due to search frictions, and the actual realization of the match quality does not play a significant role.

To further support these findings, we decide to add in our model a new explanatory variable that would reflect the chance of finding a better partner. Such variable should indicate the outstanding quality of some dancers so that these have a relatively higher chance to be distinguished on the market as good potential partners; this variable should thus reduce the problem of search frictions. Our hypothesis is that while for the first group of match separations this indicator should not matter, since there are only couples that dissolve due to unsatisfactory match quality, for the second group it should be very relevant: the matches in this group are influenced by search frictions, but for individuals with outstanding qualities these frictions might be reduced and the dancers should have then higher chance to find a better partner or to be found by a better partner to form a new match.

Our construction of the new explanatory variable is built on the following rea-

soning. To succeed in finding a better partner or being found by a better partner, individuals have to signal they are performing better than others with comparable observables to distinguish themselves. Thus, we first create a matching with respect to the personal quality of both partners, the class in which they are dancing and the number of competition attended in the current class; this means we divide the couples into categories such that within each category, the combination of these characteristics is the same for all couples. Within each such category, we create a ranking of couples based on their performance (expected number of competitions needed to achieve a higher class). Because this ranking concerns only comparable couples within a category, we call it "relative ranking". To make the interpretation easier, we define the relative ranking in descending order, i.e. such that the bigger the relative ranking, the better the couple and the higher the chance to find a better partner.

Finally, we incorporate this newly created explanatory variable into our Weibull duration model to test its effect on the hazard of separation. We control again for the match quality, for the personal qualities of both partners as well as for the actual class the couple is competing in. The results represented as marginal effects on the predicted median length of relationship can be found summarized in Table 6.

As can be seen in this table, the results support our claim that the relative ranking among peers does not play a significant role for match separation in Group 1, whereas in Group 2, the more outstanding the couple, the higher chance there is that they will break up. The sign and the significance of the remaining coefficients remain unchanged. This again supports our hypothesis that a dominant fraction of matches in Group 2 break up due to the presence of search frictions.

		Group 1	Group 2
Match quality		-0.163** (0.070)	-0.005 (0.040)
Relative ranking		-0.030 (0.025)	-0.026* (0.014)
Man personal quality dummies	A	12.518** (5.150)	12.717*** (3.633)
	B	16.582** (7.566)	7.713*** (2.066)
	C	0.106 (3.676)	3.978* (1.567)
Woman personal quality dummies	A	3.784 (4.365)	10.254*** (2.658)
	B	-4.792 (3.061)	8.954*** (2.197)
	C	1.436 (4.499)	7.003*** (2.266)
Class Dummies		Yes	Yes
<i>N</i>		273	354

Standard errors in parentheses

\*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

Table 6: Marginal effects on the predicted median length of relationship

Overall, our results tell us that matches in Group 1 and Group 2 are of very different nature. In the second group, we have a high proportion of mismatched couples, who could not find their ideal partner directly from the beginning due to search frictions (as explained in Section 5.1.5). These couples engage in on-the-job search (shown in Section 5.1.1), which results in finding a better partner especially if the couple is of outstanding quality among their peers (proven by negative impact of relative ranking on the match stability). The structure of the new matches created after finding a better partner resembles much more the structure of Group 1, where couples are formed by individuals with comparable personal quality. The stability of these matches is then influenced by their joint performance that determines the quality of the match. If this quality reveals to be too low, the couple is likely to break up.

This description of formation and separation of matches summarizes the results of the analysis we provided in this paper. It shows that both search frictions and initial uncertainty about match quality are relevant and realistic causes of match separation, and that both of them has to be taken into account in matching market literature.

## 6 Conclusion

In this paper, we contributed to the understandings of different determinants of match separation proposed by matching market theory. We focused particularly on two main causes of match separation search frictions and initial uncertainty about match quality, which are described in theoretical literature and which are tested in the context of marriage and labor markets. We claim that in theses markets, it is difficult if not impossible for the researcher to observe the objective match quality

and therefore it is problematic to assess its impact on the stability of the match.

To add a new perspective to this issue, we used a unique dataset containing records from Czech ballroom dancing competition. Ballroom dancing is a particular matching market that mimics several important characteristics of a marriage market: monogamic couples of individuals of opposite gender are formed in order to perform some common task from which both partners derive their utility. In addition, in this market, the performance of the couple is evaluated regularly by referees on competitions in which the couples participate, which provided us with a measure of objective match quality and its evolution over time. Moreover, we were able to observe also the individuals' performance over their whole career and assess information about their potential talent.

After excluding exogenous causes of match separations like end of the career or migrating to another city we identified over 600 matches that ended due to the two determinants of match separations that are proposed by theoretical . Further we were able to divide these matches into two groups of approximately same size. Through a series of different test, we provided conclusive evidence that whereas the first group contained only those matches that ended due to the unsatisfactory realization of match quality, in the second group, the dominant reason for match separation was the "on the job search" for better partner caused by the presence of search frictions.

These results let us believe that indeed both prevalent theories of reason for match separation discussed in the theoretical literature, namely search frictions and initial uncertainty about match quality, play a significant role and both of them should be taken into account.

## References

- Becker, G. S. (1973). A theory of marriage: Part 1. *Journal of Political Economy*, 81(4):813–46.
- Becker, G. S., Landes, E. M., and Michael, R. T. (1977). An economic analysis of marital instability. *Journal of Political Economy*, 85(6):1141–87.
- Brien, M. J., Lillard, L. A., and Stern, S. (2006). Cohabitation, marriage, and divorce in a model of match quality. *International Economic Review*, 47(2):451–494.
- Kalmijn, M. and Poortman, A.-R. (April 2006). His or her divorce? the gendered nature of divorce and its determinants. *European Sociological Review*, 22(2):201–214.
- Mortensen, D. T. (1988). Matching: Finding a partner for life or otherwise. *American Journal of Sociology*, 94:pp. S215–S240.
- Topel, R. H. and Ward, M. P. (1992). Job mobility and the careers of young men. *The Quarterly Journal of Economics*, 107(2):439–79.
- Vozar, M. (2010). The Effect of Time in a Multi-Dimensional Marriage Market Model. *SSRN eLibrary*.
- Weiss, Y. and Willis, R. J. (1997). Match quality, new information, and marital dissolution. *Journal of Labor Economics*, 15(1):S293–329.