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Conference Paper

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Beiträge zur Jahrestagung des Vereins für Socialpolitik 2013: Wettbewerbspolitik und Regulierung in einer globalen Wirtschaftsordnung - Session: Family and Fertility, No. A11-V3

Provided in Cooperation with:

Verein für Socialpolitik / German Economic Association

Suggested Citation: Rundshagen, Bianca (2013) : Mediation - Boon or Bane for the Stability and Efficiency of Marriage?, Beiträge zur Jahrestagung des Vereins für Socialpolitik 2013: Wettbewerbspolitik und Regulierung in einer globalen Wirtschaftsordnung - Session: Family and Fertility, No. A11-V3, ZBW - Deutsche Zentralbibliothek für Wirtschaftswissenschaften, Leibniz-Informationszentrum Wirtschaft, Kiel und Hamburg

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Mediation – Boon or Bane for the Stability and Efficiency of Marriage?

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Abstract: Using non-cooperative game theory the effects of mediation on the divorce rate and on the utility of the spouses are analysed. Two kinds of mediation are considered: restricted mediation that reduces the costs of divorce and extended mediation that additionally may prevent divorces by demonstrating the potential for Pareto improvements within marriage to the spouses. It is shown that restricted mediation not only may increase the divorce rate but that also both kinds of mediation are not necessarily welfare improving compared to the reference scenario without mediation.

Keywords: divorce; mediation; family economics; non-cooperative game theory; renegotiation-proofness

JEL classification: D13, C72

1. Introduction

The literature on family economics goes back to Becker (1981).² In the game theoretic branch of this literature marriage is usually modelled as a cooperative game.³ The predominant equilibrium concept in the analysis of bargaining within marriage is the Nash bargaining solution with non-cooperation or divorce as threat point. An important characteristic of this and other cooperative bargaining solutions, as for example the Shapley value, is that the equilibrium belongs to the set of Pareto optimal allocations. However during conflicts within marriage and in particular in case of divorce Pareto optimal, cooperative behavior is rather limited. Hence the analysis of these conflicts within a non-cooperative context has more intuitive appeal.⁴ This approach is followed in the paper at hand. In particular, we analyze the effects of mediation in conflict situations of marriage and divorce and use the non-cooperative equilibrium concepts of subgame perfectness and renegotiation-

¹ The author is indebted to Alfred Endres for helpful comments on an earlier draft of this paper.

² For an overview see, e.g., Lundberg and Pollak (2007).

³ See, e.g., Manser and Brown (1980), McElroy and Horney (1981), Lundberg and Pollak (1993), Chiappori et al. (2002) and Aura (2005).

⁴ Lundberg and Pollak (1994) and Konrad and Lommerud (1995) use non-cooperative models to analyse intrafamily bargaining. However they analyse the equilibrium production of intra-household public goods and do not deal with the stability of marriage. Zhlyevskyy (2012) analyses the stability of marriage within a non-cooperative finite game framework but doesn't consider mediation.

proofness.⁵ The basic model goes back to Waldron (2000) who characterizes marriage as an infinitely repeated prisoner's dilemma.

Mediation, as used in law, is a form of dispute resolution, where a third party, the mediator, helps spouses to negotiate an agreement in conflict situations. The intended purpose of mediation is to identify potential for Pareto improvements and hence to improve social welfare. The paper at hand analyses whether mediation can indeed be expected to be welfare improving or whether it also can reduce social welfare under certain circumstances.

We consider two mediation scenarios that reflect different interpretations of mediation in the family context. In the first mediation scenario we consider only pure divorce mediation. This scenario reflects the situation of countries as, e.g., Ireland or U.S. states, with a free of charge mediation service which can only be engaged if the spouses have finally decided to divorce.⁶ There the role of mediation is restricted as follows: the mediator simply helps the parties to reach a separation agreement. This can be formalized by a decrease of transaction cost. In other countries as, e.g., Germany or the United Kingdom the term mediation gets a wider dimension.⁷ There it is not restricted to divorce mediation but also includes family mediation, which may try to help the spouses to fix their broken marriage. These interpretation of mediation is reflected by the second mediation scenario.⁸ Within these scenarios, we demonstrate that the offer of mediation may not only increase the rate of divorce but, counterintuitively, may also reduce the utility of the spouses compared to a scenario without mediation.⁹ The intuition behind this result is that the offer of mediation makes defections within marriage more attractive, since future consequences are weakened.

We proceed as follows: In section 2 we analyse the equilibrium strategy within marriage and the stability of marriage in a reference scenario without mediation. In section 3 we consider a mediator, who may reduce the costs of the dissolution of marriage, if the spouses seek advice from him in the divorce case. In section 4 we assume that the mediator may not only reduce divorce costs but may potentially even prevent the dissolution of a marriage, by demonstrating possible Pareto improvements of the spouses' behavior. Whereas in sections 3 and 4 we compare the equilibrium outcomes with respect to global welfare ex ante, in section 5 we additionally make an ex post welfare comparison, that considers the welfare effects after a (potentially irrational) deviation has already occurred. We conclude in section 6.

⁵ In this paper we do only consider a conflict situation which is grave enough to rule out a resolvement by the couples themselves. For weaker kinds of disputes and there resolvement by the couples themselves aided by internal and external norms see e.g. Scott and Scott (1998). The cooperative bargaining model by Lundberg and Pollak (1993) (see footnote 2) can also be interpreted as analysing such weaker kind of disputes.

⁶ For further information see e.g.

http://www.citizensinformation.ie/en/birth_family_relationships/separation_and_divorce/family_mediation_service.html#l62fd2 or <http://www.nycourts.gov/ip/adr/divorcemediation.shtml>.

⁷ For further information see e.g. www.nationalfamilymediationservice.co.uk/.

⁸ For regions with divorce mediation only, the second mediation scenario can be interpreted as a simultaneous offer of divorce mediation and family therapy.

⁹ For other sources of changes of the divorce rate see e.g. Stevenson and Wolfers (2008).

2. Scenario I: no mediation

As, e.g., Waldron (2000), we formalize marriage as an infinitely repeated prisoners' dilemma, where the spouses may either behave non-cooperatively or cooperatively.¹⁰ In each period the spouses $i \in \{M, W\}$ choose their strategy $s_i \in \{C, D\}$, where C denotes cooperative behavior and D denotes defection (= non-cooperation).¹¹ Thereby (at least from the point of view of the spouses) strategy D represents a grave misbehavior that is serious enough to jeopardize the stability of marriage. Let $\pi_{s_i s_j}$ denote the utility of player i , if he chooses the strategy s_i and player j , $j \neq i$, chooses the strategy s_j . We assume that $\pi_{DC} > \pi_{CC} > 0 > \pi_{DD} > \pi_{CD}$ and $\pi_{CC} > (\pi_{CD} + \pi_{DC})/2$ holds. That is, mutual defection is the unique equilibrium in dominant strategies. Additionally mutual defection is Pareto-dominated by mutual cooperation, which in turn would produce the highest aggregate utility. The discount factor is assumed to be given by δ .¹² To analyze whether mutual cooperation can be sustained as a subgame perfect equilibrium we consider the trigger strategy as strongest possible punishment in the infinitely repeated game of marriage. As an additional outside option we consider the possibility of divorce to terminate the game. If mutual cooperation is played during the whole game each spouse receives the aggregate discounted utility

$$NB_{\Sigma}^* = \sum_{t=0}^{\infty} \delta^t \pi_{CC} = \frac{\pi_{CC}}{1-\delta} \quad (1)$$

If player i deviates, he once receives the payoff π_{DC} . If the deviation is punished with the trigger strategy, the aggregate discounted utility of the deviator is given by¹³

$$\pi_{DC} + \sum_{t=1}^{\infty} \delta^t \pi_{DD} = \pi_{DC} + \frac{\delta \pi_{DD}}{1-\delta} \quad (2)$$

Hence without considering the outside option *divorce*, mutual cooperation is a subgame perfect equilibrium, if (1) is at least as high as (2) or equivalently, if

$$\pi_{CC} \geq \tilde{\pi}_{Tri} := (1-\delta)\pi_{DC} + \delta\pi_{DD} \quad (3)$$

holds.¹⁴ Let us now consider the additional outside option *divorce*. We assume that the nonrecurring costs of divorce are given by $d < 0$ per spouse. Note that these costs should be interpreted as a net

¹⁰ Note that infinitely repeated games efficiently mimic the situation of decision makers who are uncertain about when the game will end. See, e.g., Binmore (2007), p. 325, Mailath and Samuelson (2006), p. 106/7.

¹¹ Waldron (2000) uses the terms self- and spouse-focused for the two strategies.

¹² The discount factor can be interpreted as $\delta = p/(1+i)$ with i denoting the interest rate and p denoting the survival probability.

¹³ We use the expressions utility and welfare synonymously.

¹⁴ Note that in case of indifference between mutual cooperation and defection with subsequent punishment we assume that the spouses choose mutual cooperation.

present value, which is composed of costs that occur in the divorce period and discounted costs that occur in the future (as e.g. alimony payments).¹⁵ After a defection both spouses prefer *divorce* over *mutual defection*, if and only if

$$|d| < |\pi_{DD}|/(1-\delta). \quad (4)$$

Moreover, the spouses prefer *mutual cooperation* over *defection with subceeding divorce*, if

$$\pi_{CC} \geq \tilde{\pi}_{Div} := (1-\delta)\pi_{DC} + \delta(1-\delta)d. \quad (5)$$

Taking (3) to (5) together we receive the following result:

Proposition 1:

If there is no mediation, mutual cooperation is a subgame perfect equilibrium of the infinitely repeated marriage game with divorce outside option, if

$$\pi_{CC} \geq \max \{ \tilde{\pi}_{Tri}, \tilde{\pi}_{Div} \} = \begin{cases} \tilde{\pi}_{Tri}, & \text{if } |d| \geq |\pi_{DD}|/(1-\delta), \\ \tilde{\pi}_{Div}, & \text{if } |d| < |\pi_{DD}|/(1-\delta). \end{cases} \quad (6)$$

Summarizing the players prefer mutual cooperation, if the incentive to defect is overcompensated by both possible kind of sanctions, the trigger strategy and the divorce.

3. Scenario II: mediation reduces costs of divorce

We now expand our model by the offer of mediation. In Scenario II the role of the mediator is restricted to a reduction of the divorce costs.¹⁷ That is, we assume that the mediator reduces the costs of divorce to the level $m < 0$ with $|m| < |d|$.

As in section 2, equation (3) specifies the condition that the spouses prefer mutual cooperation over a single defection with subsequent punishment within marriage. However the second punishment

¹⁵ Since we do not consider interactions of the spouses after the time of divorce, it suffices to consider the net present value of divorce costs. For simplicity, as for the whole game, we assume that divorce costs are identical for the two spouses. A generalization of the model with asymmetric payoffs would not affect our main results, but complexify the analysis.

¹⁶ Since both spouses either prefer mutual cooperation or divorce, the equilibrium is independent of whether there is a unilateral divorce law or a mutual consent law. The impact of the divorce law on the divorce rate is, e.g., analysed by Gray (1998), Chiappori et al. (2002), Peters (2001) and Wolfers (2006).

¹⁷ We henceforth call this kind of mediation *restricted mediation* in order to distinguish it from the *extended mediation* considered in Scenario III.

option is weakened due to reduced divorce costs.¹⁸ Now, after a defection both spouses prefer the divorce with mediation over the trigger strategy, if and only if

$$|m| < |\pi_{DD}| / (1 - \delta). \quad (7)$$

Moreover, the spouses prefer mutual cooperation over a defection with subsequent mediated divorce, if

$$\pi_{CC} \geq \tilde{\pi}_{Med} := (1 - \delta)\pi_{DC} + \delta(1 - \delta)m. \quad (8)$$

Taking (3), (7) and (8) together we receive the following result:

Proposition 2:

Mutual cooperation is a subgame perfect equilibrium of the infinitely repeated marriage game with mediated divorce outside option, if

$$\pi_{CC} \geq \max \left\{ \tilde{\pi}_{Tri}, \tilde{\pi}_{Med} \right\} = \begin{cases} \tilde{\pi}_{Tri}, & \text{if } |m| \geq |\pi_{DD}| / (1 - \delta), \\ \tilde{\pi}_{Med}, & \text{if } |m| < |\pi_{DD}| / (1 - \delta). \end{cases} \quad (9)$$

Summarizing the players prefer mutual cooperation, if the incentive to defect is overcompensated by both possible kinds of sanctions, the trigger strategy and the mediated divorce. Since $\tilde{\pi}_{Med} > \tilde{\pi}_{Div}$ the stability of marriage tends to be weakened by mediation, which is analyzed in the following in more detail. To analyze the effects of mediation we have to distinguish three cases:

Case A: $\tilde{\pi}_{Tri} \geq \tilde{\pi}_{Med} > \tilde{\pi}_{Div}$

In both scenarios, after a defection, the spouses prefer the trigger strategy within marriage over a divorce.¹⁹ Even with mediation the costs of divorce are higher than the costs of punishment using the trigger strategy. Hence in case A the offer of mediation does neither influence the decision for or against divorce nor the equilibrium utility of the spouses.

Case B: $\tilde{\pi}_{Med} > \tilde{\pi}_{Div} > \tilde{\pi}_{Tri}$

¹⁸ Note that in case of divorce rational spouses will always choose to call upon mediation.

¹⁹ In case of indifference between the trigger strategy and (mediated) divorce we assume throughout the paper that the spouses choose the trigger strategy instead of divorce.

In both scenarios a deviation results in a divorce, however in scenario II divorce costs are reduced due to mediation. Hence the welfare effects of mediation depend on whether mutual cooperation is stable in one or both scenarios.

- a) In case of $\pi_{CC} \geq \tilde{\pi}_{Med}$ mutual cooperation is stable with as well as without mediation. Hence the offer of mediation does not influence the utility of the spouses.
- b) In case of $\tilde{\pi}_{Div} \leq \pi_{CC} < \tilde{\pi}_{Med}$ mutual cooperation is stable in scenario I without mediation, whereas the offer of mediation makes deviation with subsequent mediated divorce attractive in scenario II. In this case the offer of mediation reduces the aggregate welfare of the spouses due to $\pi_{CC} = (1-\delta)\pi_{CC} + \delta\pi_{CC} > (1-\delta)(\pi_{CD} + \pi_{CD})/2 + \delta m$.
- c) In case of $\pi_{CC} < \tilde{\pi}_{Div}$ defection with subsequent divorce is the stable equilibrium irrespective of whether mediation is available or not. Since mediation reduces the divorce costs, in this case mediation increases the aggregate welfare of the spouses.

Case C: $\tilde{\pi}_{Med} > \tilde{\pi}_{Tri} \geq \tilde{\pi}_{Div}$

In scenario I a deviation would be punished by the trigger strategy, whereas in scenario II a deviation results in a mediated divorce. As in case B, the welfare effects of mediation depend on whether mutual cooperation is stable in scenario I and/or scenario II.

- a) In case of $\pi_{CC} \geq \tilde{\pi}_{Med}$ mutual cooperation is stable with as well as without mediation. Hence the introduction of mediation does not influence the utility of the spouses.
- b) In case of $\tilde{\pi}_{Tri} \leq \pi_{CC} < \tilde{\pi}_{Med}$ mutual cooperation is stable only in scenario I without mediation. In case of scenario II defection with subsequent divorce occurs.

Due to the same reasoning as in case B.b, the offer of a mediated divorce reduces aggregate welfare of the spouses.

- c) In case of $\pi_{CC} < \tilde{\pi}_{Tri}$ defection is attractive in both scenarios. In scenario I it is punished with the trigger strategy, whereas in scenario II it results in a mediated divorce. Since the aggregated discounted utility of the spouses under mediated divorce is higher than under the trigger strategy mediation increases the aggregate welfare of the spouses.

The results of our case analysis are summarized in the following proposition.

Proposition 3:

- a) *The offer of mediation that reduces divorce costs increases the rate of divorce.*
- b) *The aggregate welfare of spouses may remain unaffected, decreased or increased by the offer of mediation.*

It should be noted that a higher divorce rate not necessarily implies reduced aggregate welfare (as in cases B.b and C.b), but may also come along with a welfare increase (see case C.c).

4. Scenario III: extended mediation

We now assume that the mediator may not only reduce the costs of divorce but may also help to save the marriage by demonstrating possible Pareto improvements within marriage compared to the trigger strategy. Since both spouses suffer from the trigger strategy, this strategy is only subgame perfect, but not renegotiation-proof. Whereas the betrayed spouse may be captivated by his/her feelings of revenge and be blind to potential Pareto improvements of the punishment, the support of a neutral mediator may help to recognize the existence of possible welfare improvements within marriage. More formally, in this scenario we assume that the mediator may not only reduce divorce costs but may also identify Pareto dominating renegotiation-proof punishment strategies that may replace the trigger strategy as well as the divorce.

According to the definition of Farrell and Maskin (1989), a subgame-perfect equilibrium σ is weakly renegotiation-proof (WRP) if there do not exist continuation equilibria σ^1 , σ^2 such that σ^1 strictly Pareto dominates σ^2 (see Farrell and Maskin, 1989, p. 331). Moreover, a WRP is called strongly renegotiation-proof if none of its continuation equilibria is strictly Pareto dominated by another WRP equilibrium (see Farrell and Maskin, 1989, p. 349).

The general structure of the considered renegotiation-proof punishment strategy is as follows: if player 1 deviates, the spouses play the strategy combination (C,D) for t periods. After this so-called *punishment phase* the spouses carry on with mutual cooperation (*normal phase*). Farrell and Maskin show that a punishment strategy that fulfils the following three stability requirements is weakly renegotiation-proof (see Farrell and Maskin, 1989, p. 335):²⁰

- i) There is no incentive for the punisher to renegotiate the punishment, i.e., to abstain from the punishment and to return to the normal phase before the punishment took place. This condition is fulfilled because of $\pi_{DC} > \pi_{CC}$. During the punishment phase the punisher receives a utility that is higher than the one in the normal phase.
- ii) After a deviation the punished spouse must have an incentive to accept the punishment instead of further defecting within marriage or filing for divorce. The formal representation of this condition is given by

²⁰ Note that for simplicity of notation we only consider single deviations. However simultaneous deviations could easily be ruled out by asymmetric payoffs during mutual cooperation.

$$\bar{\pi}_p := (1 - \delta^t)\pi_{CD} + \delta^t\pi_{CC} \geq \max \{\pi_{DD}, (1 - \delta)m\}.^{21} \quad (10)$$

- iii) The punishment must be severe enough to eliminate the incentive to defect in the normal phase, i.e.,

$$(1 - \delta)\pi_{DC} + \delta\bar{\pi}_p \leq \pi_{CC}. \quad (11)$$

Moreover since mutual cooperation generates the highest aggregate payoff, and the payoffs received during the punishment phase (π_{CD}, π_{DC}) also lie on the Pareto frontier of the stage-game payoff-space, the strategy described above is also strongly renegotiation proof.²²

Neglecting the integrity condition the mediator may propose the border solution of (10), which is given by

$$\bar{\pi}_p = \max \{\pi_{DD}, (1 - \delta)m\}. \quad (12)$$

The corresponding duration of punishment is given by

$$t^* = \frac{\log \frac{\max \{\pi_{DD}, (1 - \delta)m\} - \pi_{CD}}{\pi_{CC} - \pi_{CD}}}{\log \delta}.^{23} \quad (13)$$

Inserting the punishment specified by equations (12) and (13) in the remaining condition for renegotiation-proofness (11) gives equation (9), the stability condition of marriage in scenario II.²⁴ I.e., mutual cooperation is a stable equilibrium, if $\pi_{CC} \geq \max \{\tilde{\pi}_{Tri}, \tilde{\pi}_{Med}\}$ holds. The intuition behind this

$$\begin{aligned} &^{21} \sum_{\tau=0}^{t-1} \delta^\tau \pi_{CD} + \sum_{\tau=t}^{\infty} \delta^\tau \pi_{CC} \geq \max \left\{ \sum_{\tau=0}^{\infty} \pi_{DD}, m \right\} \Leftrightarrow \left(\sum_{\tau=0}^{\infty} \delta^\tau - \sum_{\tau=t}^{\infty} \delta^\tau \right) \pi_{CD} + \sum_{\tau=t}^{\infty} \delta^\tau \pi_{CC} \geq \max \left\{ \sum_{\tau=0}^{\infty} \pi_{DD}, m \right\} \\ &\Leftrightarrow \left(\frac{1 - \delta^t}{1 - \delta} \right) \pi_{CD} + \frac{\delta^t}{1 - \delta} \pi_{CC} \geq \max \left\{ \frac{1}{1 - \delta} \pi_{DD}, m \right\} \Leftrightarrow (10) \end{aligned}$$

²² Note that (as there are multiple subgame perfect equilibria of the game) also the described strong renegotiation proof equilibrium is not unique. E.g. if player 1 has a higher bargaining power, for the normal phase the spouses could also agree on playing a correlated strategy that mixes (C,C) and (D,C).

²³ $(1 - \delta^t)\pi_{CD} + \delta^t\pi_{CC} = \max \{\pi_{DD}, (1 - \delta)m\} \Leftrightarrow \delta^t = \frac{\max \{\pi_{DD}, (1 - \delta)m\} - \pi_{CD}}{\pi_{CC} - \pi_{CD}} \Leftrightarrow (13)$

²⁴ $\pi_{CC} \geq (1 - \delta)\pi_{DC} + \delta \max \{\pi_{DD}, (1 - \delta)m\} \Leftrightarrow \pi_{CC} \geq \max \{(1 - \delta)\pi_{DC} + \delta\pi_{DD}, (1 - \delta)\pi_{DC} + \delta(1 - \delta)m\} \Leftrightarrow (6) \pi_{CC} \geq \max \{\tilde{\pi}_{Tri}, \tilde{\pi}_{Med}\}.$

result is as follows: For $\pi_{CC} < \max\{\tilde{\pi}_{Tri}, \tilde{\pi}_{Med}\}$ there is no room for Pareto improvements (which would imply a weakening of the punishment) since even the available punishment strategies of scenario II are not strong enough to preclude a defection. On the other hand in case of $\pi_{CC} > \max\{\tilde{\pi}_{Tri}, \tilde{\pi}_{Med}\}$ a weaker punishment than the equilibrium one of scenario II would be sufficient to deter defective behaviour. Since however for this parameter constellation mutual cooperation is the unique equilibrium behaviour in all three scenarios, the change from restricted to extended mediation neither influences the rate of divorce nor the aggregate utility of spouses. This result is summarized in Proposition 4.

Proposition 4:

- a) *The rate of divorce is identical in the scenarios II and III.*
- b) *The aggregate welfare of spouses is identical in the scenarios II and III.*

Taking Propositions 3 and 4 together this implies that also extended mediation increases the rate of divorce compared to scenario 1. The welfare effect may be positive, as well as negative.

5. Ex post welfare comparison

In sections 2 to 4 we have shown that counterintuitively mediation may result in a decrease of aggregate utility by the spouses. Additionally the rate of divorce decreases, if mediation can only reduce divorce costs. The intuition behind these results is that the threat of punishment is weakened and hence defections within marriage are more likely. These results were derived under the assumption that the spouses rationally decide whether they defect within marriage. Correspondingly we made an ex ante comparison of equilibrium outcomes with respect to the aggregate utility of the spouses. However, it is rather easy to imagine that a single defection might occur irrationally (e.g. under the influence of alcohol), i.e., even if it is not an equilibrium strategy. If, in this case, we compare the ex post welfare effects, after a deviation has already been occurred, the welfare effects of mediation are more favourable: Restricted mediation still increases the rate of divorce, but has unambiguous positive welfare effects. In case of extended mediation the welfare effect is further improved, since divorces and trigger punishments are replaced by renegotiation-proof Pareto dominating punishments. As we have seen in section 4, in case of $\pi_{CC} > \max\{\tilde{\pi}_{Tri}, \tilde{\pi}_{Med}\}$ a weaker punishment than the equilibrium one of scenario II would be sufficient to deter defective behaviour. That is, the mediator may propose a duration of punishment which is smaller than t^* determined by equation (13). In this case not only the punishing player prefers the strategy proposed by the mediator over the trigger strategy and the mediated divorce but also the spouse who defected within marriage.

6. Conclusion

We have shown that the welfare effects of mediation depend on whether a defection within marriage is considered to be rational or irrational. If a decision to cheat on one's spouse is assumed to

be always of the rational type, mediation may have negative welfare effects since it weakens the deterrence effect of possible punishments.

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