INTERNATIONAL SOCIAL SECURITY ASSOCIATION

# The Return on Work Reintegration

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# Content

# Acknowledgements

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# Executive summary

In this report, we use financial balance sheets for employers, social security systems and society to estimate the global return on investments directed at medical and vocational rehabilitation measures for injured workers and workers absent on the grounds of health with the goal of permitting reintegration in the workplace. Returns on these investments are calculated, according to three hypothesized effect-size scenarios (small, medium and large), from the perspectives of employers, social security systems and society. In spite of the restrictive assumptions used, the estimated cost-benefit ratios demonstrate the large economic potential of investing in work reintegration measures. Even for hypotheses where the effect size of interventions is small, expenditure on work reintegration and rehabilitation is an investment that offers a positive return for all stakeholders.

In the medium effect-size scenario, for every dollar invested, employers realize an average return of over three times the initial investment.

**Specifically, for expenditure on work reintegration and rehabilitation the average return-on-investment ratio for employers is 3.7.**

In turn, in the medium effect-size scenario, social security systems receive an estimated average return-on-investment of 2.9.

From a societal perspective, productivity-related costs and benefits only are considered. In the medium effect-size scenario, the estimated productivity gains outweigh investments by a factor of 2.8.

Overall, the results of this analysis demonstrate that the financial benefit of effective rehabilitation “pays off” significantly by outweighing the incurred costs.

# 1. Introduction

Although legal and social obligations can largely explain expenditures directed at rehabilitation and reintegration, supporting people in the work reintegration process is also an economic imperative. From the perspective of employers, lower levels of personnel turnover mean less disruption of business operations and thus increased economic productivity. At the same time, enterprises are able to reduce costs with regard to the recruitment and training of new personnel. Investments in programmes that enable workers who are injured or absent on health grounds to return to work can thus be important elements in controlling company costs and securing competitiveness.

With regard to social security organizations, the economic benefits of work reintegration measures are most clearly visible. By reintegrating a worker back into meaningful work, this prevents the payment of long-term disability pensions and daily worker compensation. Additionally, because of higher productivity, contribution collection rises. Accordingly, social security organizations and employers have a strong stake in optimizing the return-to-work process of workers.

Re-orienting the provision of health services towards the maintenance of employment is central to ensure that workers experience rapid and sustained recovery. When returning a worker – as soon as medically possible – back to productive work, the person's healing process is accelerated, thereby the need for medical care is lessened and earning capacity is maintained (Waddell and Burton, 2006). In contrast, disabled persons who are not able to work for extended periods are likely to experience multidimensional deprivations linked to their status of non-employment, reducing their chances of successfully returning to work.

Programmes that enable workers who are injured or absent from work on health grounds to return to work can, thus, also be viewed as important drivers of economic stability and growth (OECD, 2009). By assisting workers in the work reintegration process, it is possible to minimize the negative impacts of disabling injuries and diseases and other health conditions on the overall level of production. Furthermore, additional taxes are generated, future possible health care and medication costs are preventable, and the burden for families and society with regard to providing care should be lower. As such, the production of more goods and services is possible, benefitting the involved stakeholders and society as a whole.

Although rehabilitation and reintegration measures are economically important investments, debates about such measures' high costs often dominate public discussions. In order to assess whether rehabilitation is a worthwhile investment from a financial perspective, it is necessary to itemize the services and their resulting costs to be able, consequently, to evaluate them economically. This study seeks to better identify and measure the economic benefits of work reintegration. The primary objective of the project is to investigate work reintegration efforts in different countries and, based on the scope and quality of the services performed, carry out cost-benefit calculations.

The research was initiated by the Technical Commission on Insurance against Employment Accidents and Occupational Diseases of the International Social Security Association (ISSA), within which the German Social Accident Insurance (*Deutsche Gesetzliche Unfallversicherung* – DGUV), the lead authoring institution of this report, is an active member. Other project partners are the Canadian National Institute of Disability Management and Research (NIDMAR), Rehabilitation International (RI) and IBM Cúram. Aside the simulation of return on investment factors, another goal of the research project is the development of an "online intervention calculator", which will enable stakeholders to carry out independent calculations on the profitability of alternative investment decisions. NIDMAR, in collaboration with IBM Cúram, leads this part of the project. The ISSA will post a link to the calculator on the ISSA portal (www.issa.int).

The remainder of this report is structured as follows: Section 2 introduces the data, methodology and indicators used to identify possible return on work reintegration (RoWR) factors for employers, social security systems and society. In Section 3 the results of the economic simulation of the surveyed work-reintegration measures are presented and discussed. Section 4 offers general conclusions. In the Appendix, we provide additional information with regard to the method used. In particular, in Appendix I the calculation of prevented employment losses and prevented sick days as well as the calculation of the economic impact is shown by means of a numerical example. In Appendix II, the case study of Germany is presented, exemplifying the return on investment (RoI) results on an individual country basis, including a detailed demonstration of the separate cost and benefit drivers. In Appendix III, an overview of the effect of different baseline assumptions on model outcome is illustrated.

## 2. Data and methods

In order to carry out an economic evaluation of work reintegration measures, there is a need for information on programme utilization, programme benefits and associated costs. The available statistics enable a comparison of the provision of work reintegration services and incurred expenditures. This is carried out on two levels. First, the study gives an overview of the overall economic effects of medical and vocational rehabilitation. Second, the data offers the possibility to calculate likely effects on the budgets of the participating (social security) insurance organizations and the enterprises that employ the workers undergoing rehabilitation.

Generally, it is not difficult to determine the scale of programme activity and incurred expenditures through the means of controlling and cost accounting. For this reason, over a two-year period, a questionnaire was developed and distributed to national social security providers in different countries. Specifically, the scope, success and costs of provided work reintegration services were the focus of the data collection.

### The sample

In the questionnaire, social security organizations were asked to provide administrative data on the type, utilization, duration and costs of work reintegration measures carried out. In total, questionnaires were sent to 75 organizations in 50 countries. All contacted organizations are affiliated with the International Social Security Association and all have shown engagement in work reintegration. Out of these, 19 organizations from 12 countries completed the questionnaire in a way for it to be included in the return on investment (RoI) simulation.[1] From the 12 countries for which the economic impact was calculated, five are located in Europe, two in North America, two in Asia, and one each from Africa and South America. The twelfth country is New Zealand.

Table 2.1 presents additional information on the type of included social security organizations. In the sample of the 19 organizations, 14 are providers of social insurance for occupational risks while two cover old-age pensions, two are general social insurance providers and one is a provider of health insurance. As such, the organizations differ with respect to the duties and the assistance offered with regard to work reintegration measures. Not all organizations offer comprehensive measures, or have the required data at hand. As a result, the estimation can only take into account those measures for which data on the number and costs of work reintegration measures are available.

The surveyed organizations were asked to provide data on ambulatory, stationary and vocational rehabilitation measures (Box 2.1). In particular, nine organizations provided data on ambulatory, 16 on stationary, and 13 on vocational rehabilitation measures.

1. Owing to missing cost or rehabilitation data, nine submitted questionnaires were not used; giving an overall response rate of 28 out of 75, which is around 37 per cent.

**Box 2.1.** *Definition of different rehabilitation measures*

- Ambulatory rehabilitation is a form of medical care provided on an outpatient basis.
- Stationary or inpatient rehabilitation is a form of medical care for patients whose condition requires admission to a hospital or rehabilitation clinic.
- Vocational rehabilitation measures are used to overcome barriers to maintaining or obtaining an employment relationship.

**Table 2.1.** *Type of insurance and interventions assessed*

| Type of insurance | |
|---|---|
| Work accident | 14 |
| Pension | 2 |
| General social insurance | 2 |
| Health insurance | 1 |
| Total | 19 |
| Type of interventions assessed per organization | |
| Ambulatory rehabilitation | 9 |
| Stationary rehabilitation | 16 |
| Vocational rehabilitation | 13 |

## Costs of work reintegration measures

The main goal of this study is to compare the costs and benefits of work reintegration measures. The social security organizations provided data on **treatment and compensation expenditure** for the type of interventions listed in Table 2.1. Taken together, these costs inform about the financial investment made by social security systems. The RoI calculation for social security systems uses this data.

Apart from the direct costs of work reintegration measures, indirect costs resulting from programme participation also play an important role. Those are the losses in productivity associated with the time spent in rehabilitation. For that reason, the questionnaire asked about the duration of the rehabilitation measures. The purpose of surveying **the duration of rehabilitation measures** is to calculate how much potential working time is lost because of programme participation.[2]

In the questionnaire, organizations were asked to provide the total number of missed working days due to medical rehabilitation measures per field of rehabilitation. The organizations that had available data had durations ranging from five to 23 days for ambulatory rehabilitation and from 14 to 42 days for stationary measures, with averages of 14.3 days and 26.5 days, respectively. Table 2.2 gives an overview of the average duration of ambulatory and stationary rehabilitation measures, as surveyed. For those organizations (n=2) that were unable to provide duration data, average values from the sample were used to fill in the missing data.

2. The loss of working time is only relevant with regard to those workers registered as absent from paid work during rehabilitation. Workers undergoing rehabilitation who are unable to work without rehabilitation cannot exhibit a loss in working time: they are already absent. As such, their participation in rehabilitation does not cause any indirect or productivity-related costs.

**Table 2.2.** *Average duration of interventions*

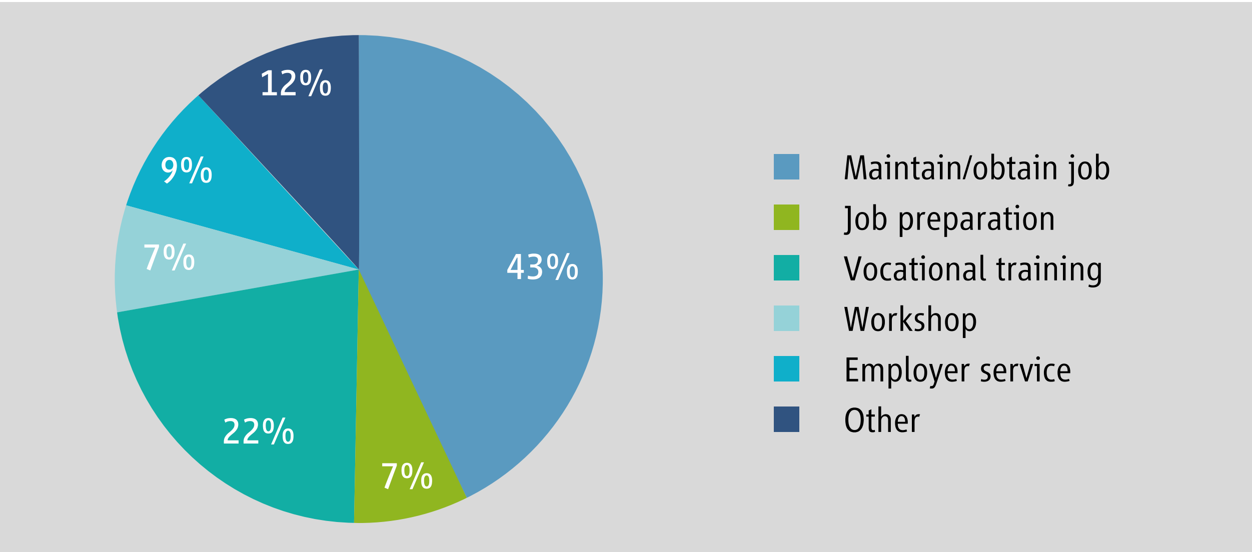
| Average duration of interventions | |
|---|---|
| Ambulatory rehabilitation | 14.3 days (stdev. 7.4) |
| Stationary rehabilitation | 26.5 days (stdev. 9.2) |

With regard to vocational rehabilitation measures, organizations were generally not able to provide statistics on the duration of the measures (Box 2.2). To provide a basis of calculation for the missed working time during vocational rehabilitation, data on the distribution of applied interventions were retrieved and multiplied with an estimate of the duration for each category. Figure 2.1 gives the distribution of vocational rehabilitation measures throughout the surveyed organizations (weighted average). The most frequently used interventions are measures to assist workers to maintain or obtain employment (45 per cent), followed by vocational training courses (21 per cent), employer services (8 per cent), job preparation (7 per cent) and workshops for the disabled (7 per cent). Other types of vocational rehabilitation make up the remainder of the interventions (12 per cent).

**Box 2.2.** *Categories of vocational rehabilitation measures*

- Measures to maintain or obtain an employment relationship (supported employment) refer to service provisions in which people with disabilities are assisted with obtaining and maintaining employment.
- Job preparation measures refer to training courses or counselling sessions aimed at preparing the (disabled) individual for work in the regular labour market.
- Vocational education/training measures refer to education that prepares people to work in professional vocations. Vocational education measures are usually based on manual or practical activities and are traditionally non-academic but related to a specific trade or occupation.
- Workshops for people with disabilities refer to programmes consisting of routine-oriented tasks and activities that allow people with disabilities to gain work experience outside the regular labour market before entering the workforce.
- Employer services refer to direct assistance given to employers to adapt the workplace to accommodate disabled persons.

**Figure 2.1.** *Distribution of vocational rehabilitation measures*



The types of vocational rehabilitation measures applied differ substantially with regard to the required time off work. For example, a vocational training course usually takes between three and twelve months, but, in some extreme cases, this can be longer. During this period, the worker in all likelihood could have carried out some other form of basic work. In contrast, employer services and assistance in maintaining or obtaining a job do not require any additional time off. The following estimates provide the basis for calculating the potential time lost due to vocational rehabilitation measures for each category:[3]

- Vocational education: Nine months lost.
- Workshop for people with disabilities: Twelve months lost.
- Vocational preparation: Three months lost.
- Assistance in maintaining/obtaining job: No time lost.
- Employer services: No time lost.
- Other: No time lost (e.g. mobility grants, commuting services, etc.).

## Economic benefits of work reintegration measures

There are different ways to measure and assess economic benefits. For example, in a cost-effectiveness analysis, consequences are valued in natural units such as prevented employment losses or the number of sick days accrued. In contrast, in a cost-benefit analysis, a broader concept of value is used to express the benefits also in monetary terms. This requires translating the natural units into a monetary value that can be compared with the costs (Drummond et al., 2015).

The direct economic benefits consist of the prevention of employment losses as well as sick days, and indirectly of secondary effects generating economic advantages for the stakeholders involved. With only observational data at hand, it is uncertain to what extent employment outcomes such as the return to work (RtW) rates and prevented sick days attained by the surveyed institutions are the result of the applied measures. This means that it is generally not possible to assess what the outcome would have been without the rehabilitation measures. Natural control groups are unavailable, limiting the possibilities to calculate causal relationships. However, it is possible to simulate the potential causal effect given carefully chosen assumptions, to see how large the potential RoI factors under each of the hypothesis would be. This report presents three scenarios, each reflecting a different relative effect size (ES) level.[4] The general idea behind an effect size is that relative improvements can be standardized and put on a scale from small to large. As such, we attribute to every intervention carried out a fixed probability of it preventing an employment loss and reducing the number of sick days.

The resulting number of potentially prevented work disabilities and sick days are subsequently converted into a monetary value permitting a comparison with the costs of the measures. The latter are held fixed throughout the scenarios thus yielding the potential RoI at current costs. Drawing up the net effects based on the scenarios provides a feasible alternative to evaluate the economic potential in monetary terms, when data is otherwise unavailable. In particular, the comparison between scenarios allows evaluating the possible differences in financial returns linked to having a more effective worker reintegration system, all other things being equal.

3. Values are estimates, based on the experience of the project group.

4. The scenarios are designed based on a statistical logic by Cohen (1988), who popularized a measurement, the effect size, to judge the strength of a phenomenon.

### *Effect on employment outcomes (RtW rate and number of sick days)*

With the development of the three ES scenarios, two particular aspects of changes in working status are modelled: the increased likelihood of returning to work, and the effect on worker absenteeism.[5] Changes in return-to-work odds (RtW odds) and changes in the number of sick days when returning to work are simulated using the ranges specified by Cohen (1988). In particular, a small effect size is linked to a 1.5 improvement in RtW odds, while a medium ES is linked to a 2.5 improvement and a large ES is linked to a 4.3 improvement. Given that some of the workers undergoing rehabilitation would return to work without the rehabilitation measures, changes in the number of sick days are modelled instead. Hereby a small ES is linked to a 20 per cent reduction in sickness absence, while a medium effect is linked to a 50 per cent reduction and a large effect linked to an 80 per cent reduction. Table 2.3 gives an overview of the effect sizes associated with a small, medium and large relative improvement.

Before estimates on the improvements in RtW and on sick time can be simulated, baseline values have to be defined, reflecting what would happen to workers without treatment. It is necessary to also define a baseline, since the same relative effect size can have different absolute effects, depending on how likely the outcome is. Appendix III provides an overview of the effect of different baseline parameters on absolute intervention effects to illustrate this property. To reflect patient heterogeneity across rehabilitation fields, different baseline parameters for ambulatory, stationary and vocational rehabilitation treatments are used in the simulation. In particular, it is assumed that the risk of disability-linked unemployment is higher for workers in vocational rehabilitation compared to workers in stationary or ambulatory rehabilitation. This is a realistic assumption, as the motivation for vocational rehabilitation is linked often to difficulties in finding or regaining employment. Similarly, it is reasonable to assume that people engaged in stationary rehabilitation measures are at a higher risk of not returning to work compared to those receiving ambulatory rehabilitation. Table 2.4 presents an overview of the baseline assumptions used.[6]

**Table 2.3.** *Overview of effect sizes*

| Effect size | No effect | Small effect | Medium effect | Large effect |
|---|---|---|---|---|
| Return-to-work odds | 1 | 1.5 | 2.5 | 4.3 |
| Sick day reduction | 0 | 0.2 | 0.5 | 0.8 |

**Table 2.4.** *Scenario assumptions: Assumed health situation of the rehabilitants w/o rehabilitation*

| Type of measure | Average baseline RtW chance | Absenteeism baseline standard deviation |
|---|---|---|
| Ambulatory rehabilitation | 75% | 28 |
| Stationary rehabilitation | 60% | 42 |
| Vocational rehabilitation | 45% | 56 |

5. The strength of association between two binary data values is normally measured through the odds ratio, while changes in continuous variables are standardized usually through "Cohen's d", the standardized mean difference between two populations.

6. Values are estimates, based on the experience of the project group.

Applying the different effect sizes to the baseline characteristics permits us to retrieve estimates of the possible effects of the measures on the number of prevented employment losses and sick days. Table 2.5 presents the treatment effects (assumptions) for the small, medium and large impact scenarios. Here, a 7 per cent increase in the chance of RtW conveys that out of 100 persons treated, an additional seven return to work.[7] All persons undergoing rehabilitation whose employment status is unchanged after rehabilitation but who do return to work are simulated to experience an improvement in the number of prevented sick days. Persons undergoing rehabilitation that are simulated to not return to work, are not attributed any benefit in this model; i.e. in the small scenario, for 100 ambulatory measures carried out, there are 7 prevented employment losses and 75 * 6 = 450 prevented sick days. In the medium scenario 13 prevented employment losses and 75 * 14 = 1,050 prevented sick days, etc.

**Table 2.5.** *Scenario assumptions: Assumed effect on RtW rate and worker absenteeism*

| Scenario | Assumed effect on RtW rate | | | Assumed effect on absenteeism | | |
|---|---|---|---|---|---|---|
| | Small | Medium | Large | Small | Medium | Large |
| Ambulatory rehabilitation | 7% | 13% | 18% | 6 days | 14 days | 22 days |
| Stationary rehabilitation | 9% | 19% | 27% | 8 days | 21 days | 34 days |
| Vocational rehabilitation | 10% | 22% | 33% | 11 days | 28 days | 45 days |

Summing up, the simulated results of all measures from participating organizations from each country informs about the number of potentially **prevented employment losses and the number of prevented sick days**.

## *Effect on economic productivity and company costs*

To assess the monetary value of prevented employment losses as well as sick days, changes in economic production are calculated. The challenge here lies in identifying the production loss that occurs to an employer if a worker is absent. Throughout the surveyed literature the human capital approach and the friction cost approach are the main models used to assess the loss of productivity due to absenteeism (Drummond et al., 2015).

The basic idea of the friction cost approach is that the amount of production lost due to a worker being absent from work depends on the enterprise's ability to compensate the employment loss in the short and long term. Whereas the human capital approach provides a more intuitive illustration of productivity effects, as every single day out of work is valued at a full wage loss, the friction cost method provides a more realistic estimate with regard to actual production losses (Koopmanschap et al., 1995). Simulating a full wage loss as done in the human capital approach overestimates the actual intervention effect, as some lost production in the short term is usually compensated by co-workers. Moreover, the employer, after a friction period, will be able to hire a replacement worker. Productivity can potentially thus be re-established to the original level after the recruitment of a new worker from the pool of available workers. The period in which productivity losses occur are, therefore, significantly shorter compared to estimates based on the traditional human capital approach (Drummond et al., 2015).

7. In terms of the number who require treatment, 1/0.07 = 14 people who need to be treated in order to prevent one employment loss.

In this study, we use the friction cost method to estimate the effect of work reintegration measures on economic productivity. Thereby, we differentiate between a short-term and a long-term perspective.

- Short term: Partial loss of productivity, with the recovery of some productivity by co-workers at additional overtime costs.
- Long term: Re-establishment of the original productivity level, with expenses linked to finding and training a new employee.

The length of the friction period is determined by the time it takes to refill the position and to train the new employee to the level of the previous worker. We estimate friction periods based on empirical results for Canada, Germany and the United States, whereas for the other countries values are based on the authors' judgments.

As only a part of the wage is lost during the friction period, we need to develop a proxy for the work lost. To know how much work is lost during workers' absences, we estimate the elasticity of production with respect to changes in labour supply.[8]

The costs employers have to pay to end a friction period in the long term are defined as one-off recruitment costs for finding and training a new employee. In this study the cost for recruitment and training is set at the value of two monthly salaries, which is closely linked to the findings of Boushey and Glynn (2012). The questionnaire asked for data on the average salary among insured workers. Since co-workers recover some of the work lost, savings are possible on overtime costs. The overtime rates used come from official regulations in the surveyed countries; except for Germany, New Zealand and Poland, since for these latter countries there is no federal law regulating overtime pay. Table 2.6 lists the country-specific labour market parameters used.

**Table 2.6.** *Overview of country specific friction cost parameters*

| Country | Average monthly wage (USD) | Length of friction period (weeks) | Overtime rate | Elasticity of production with respect to labour |
|---|---|---|---|---|
| Austria | 2,899 | 10 | 150% | 0.2 |
| Canada | 3,293 | 10 | 150% | 0.2 |
| Chile | 969 | 8 | 150% | 0.4 |
| Finland | 4,283 | 10 | 150% | 0.2 |
| Germany | 3,540 | 11 | 125% | 0.2 |
| Indonesia | 284 | 8 | 150% | 0.4 |
| Italy | 3,325 | 10 | 110% | 0.2 |
| Malaysia | 600 | 8 | 150% | 0.4 |
| New Zealand | 3,446 | 10 | 150% | 0.2 |
| Poland | 1,123 | 8 | 150% | 0.4 |
| United States | 4,800 | 8 | 150% | 0.2 |
| Zimbabwe | 386 | 8 | 100% | 0.4 |

8. The more elastic the supply of labour is with regard to output, the less productivity is lost when a worker is absent from work. In fact, at an elasticity of 0, all production would be lost as no additional workers can be recruited. At an elasticity of 1, no production would be lost, as a replacement worker with the same productivity level can be found instantaneously; hence, the supply would be perfectly elastic. While elasticity is different among industries and heterogeneous across absent workers, this study assumes an average value for each country. According to Marquetti (2007), the output elasticity of labour is around 0.4 for emerging countries, declining to 0.2 for countries with a high capital-labour ratio. As a result, the estimated productivity loss due to worker absenteeism is greater for more industrialized countries, which in turn means that the positive effect of RtW on productivity is also greater for those countries.

### *Effects on social security providers' budgets*

The benefits to social security providers derive from two components. For every productive workday gained, this generates additional contributions. For every prevented employment loss and prevented sick day, social security organizations save on compensation payments. The rates for additional contributions collected as well as for the compensation payments prevented are retrieved from the secondary literature. Table 2.7 lists the country-specific social security parameters used in the calculation.

**Table 2.7.** *Overview of country specific social security parameters (percentage)*

| Country | Social security contribution rate on income[1] | Temporary disability insurance benefit rate[2] | Permanent disability insurance benefit rate[3] |
|---|---|---|---|
| Austria | 42.35 | 60 | 35 |
| Canada | 15.38 | 75 | 35 |
| Chile | 22.14 | 100 | 35 |
| Finland | 30.60 | 70 | 35 |
| Germany | 40.75 | 75 | 35 |
| Indonesia | 10.50 | 75 | 35 |
| Italy | 42.87 | 62.5 | 35 |
| Malaysia | 26.75 | 80 | 35 |
| New Zealand | 0.00 | 80 | 35 |
| Poland | 42.09 | 90 | 35 |
| United States | 15.90 | 66 | 35 |
| Zimbabwe | 7.00 | 51 | 35 |

*Notes:*

1. Retrieved from Retrieved from SSA and ISSA (2014a, 2014b, 2015a, 2015b); New Zealand is a special case without contribution collection since its programme is financed through general taxes.
2. See note 1. For Germany, Indonesia, Italy and Poland, the average of the two given values for the different providers of compensation payments was used.
3. Set by authors at 35 per cent, as most countries calculate benefits based on a variety of factors via a formula and do not provide average values. A survey of the empirical literature has shown, however, that permanent disability insurance usually recovers around 30–40 per cent of past earnings on average.

## Cost-benefit balance sheets

After having monetized all the benefits and costs, it is possible to carry out cost-benefit calculations. The most common indicator in a cost-benefit analysis is the return on investment (RoI), which is measured by dividing benefits by costs.

$$RoI = \frac{Benefits}{Costs}$$

The following three balance sheets provide an overview of the individual costs and benefits for the different stakeholders.

The benefits to employers include increased productivity as well as reduced overtime and recruitment costs. On the costs side, the productivity loss due to worker absenteeism during the intervention and required overtime pay for the recovery of some of the lost time is calculated. Table 2.8 offers an overview of the employer balance sheet estimated in this report.

By preventing employment losses and sick days, social security systems benefit from reduced compensation expenditure. Moreover, this generates additional contributions due to the changes in productivity. The costs of the interventions are the direct costs as surveyed in the questionnaire, including the cost of workers compensation payments during rehabilitation. Table 2.9 presents an overview of the social security system balance sheet.

Payments between actors in an economy are not taken into account when estimating the societal RoI, because they do not affect the overall level of production. As such, the cost-benefit calculation for society consists only of productivity-related gains and losses. Table 2.10 offers an overview of the societal balance sheet.

**Table 2.8.** *Employer balance sheet*

| Employer benefits | Employer costs |
|---|---|
| Increased productivity | Decreased productivity (lost time) |
| Reduced overtime costs | Increased overtime costs |
| Reduced recruitment costs | |

**Table 2.9.** *Social security balance sheet*

| Social security benefits | Social security costs |
|---|---|
| Reduced work compensation expenditure short term | Intervention costs (from questionnaire) |
| Reduced work compensation expenditure long term | Increased overtime costs |
| Increased contributions | |

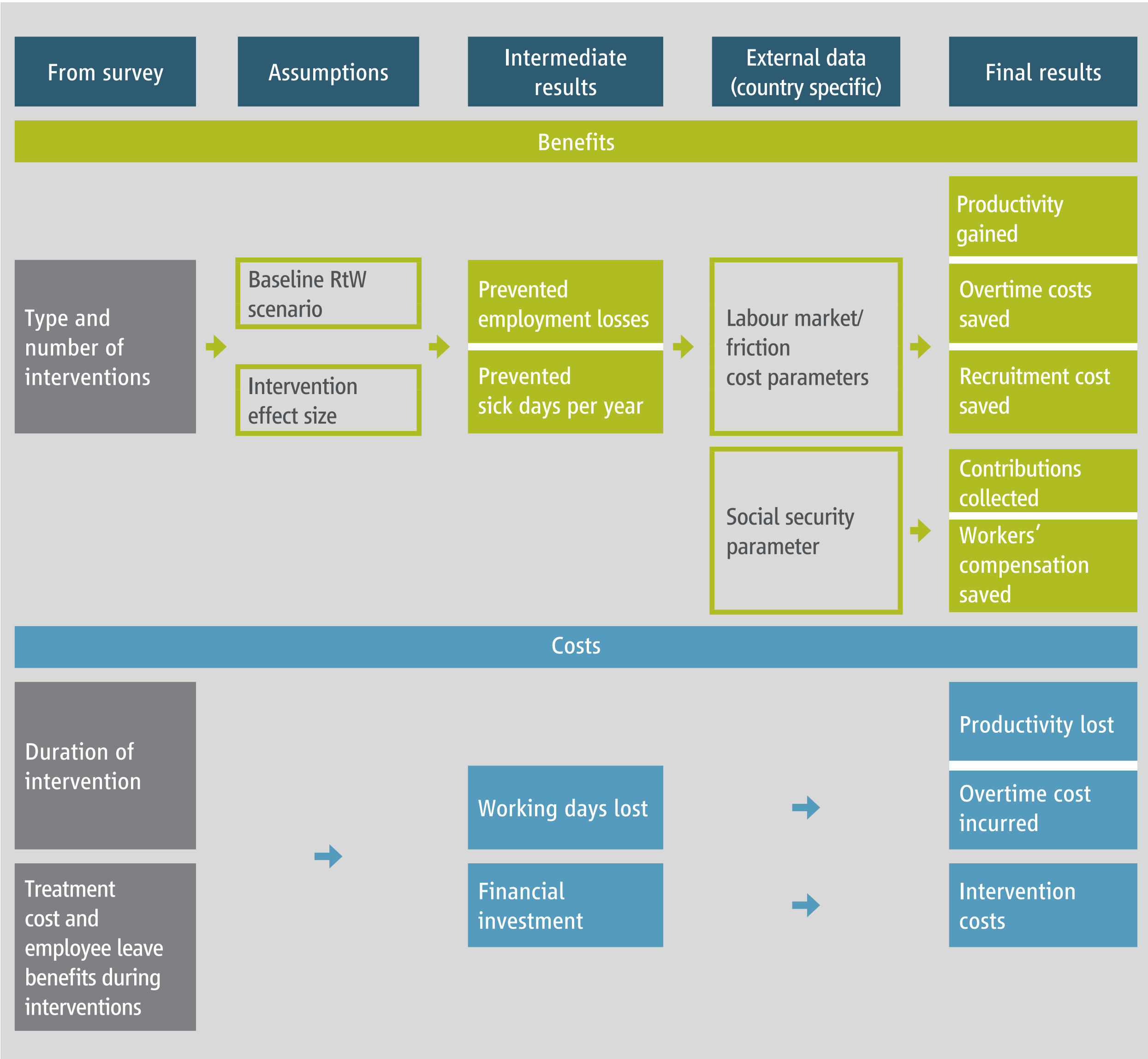
**Table 2.10.** *Societal balance sheet*

| Societal benefits | Societal costs |
|---|---|
| Increased productivity | Decreased productivity (lost time) |

## Method overview

Figure 2.2 provides an overview of all the elements in the model simulation. First, data from rehabilitation providers on the utilization and costs of work reintegration measures are collected. Second, using scenarios of different intervention effect size, the number of prevented employment losses as well as sick days compared to a no-rehabilitation scenario are determined. Third, using country-specific labour market and social security parameters, we model changes in productivity and their effect on provider budgets. Together with the number of prevented employment losses and prevented sick days, the economic benefits for all stakeholders are calculated. On the cost side, the direct costs as surveyed and the duration of the measures are taken into account to determine the direct and indirect costs of work reintegration measures for the involved stakeholders.

**Figure 2.2.** *RoWR study - Method flowchart*



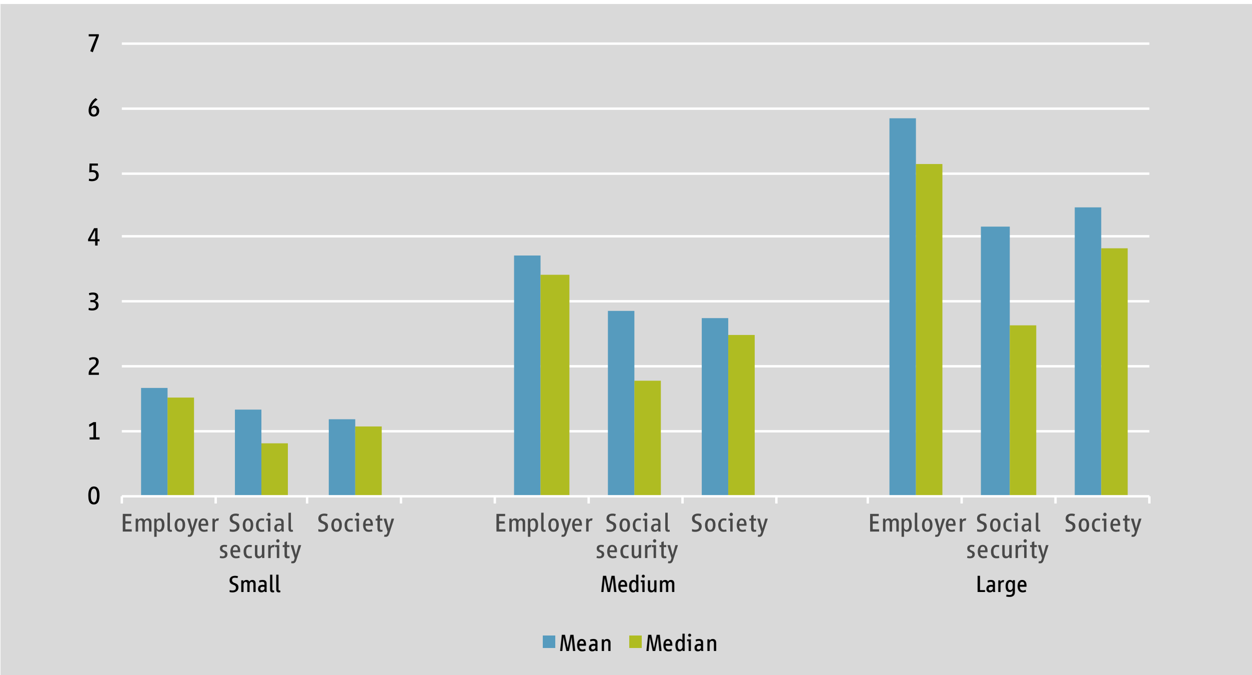
# 3. The return on investment for employers, social security systems and society

This section provides an overview of the return on investment (RoI) rates for employers, social security systems and society in consolidated form (Figure 3.1). In the economic simulation, the single factor RoI rates are estimated from each perspective separately for all three scenarios (Figure 3.1). This report does not provide a further breakdown by organization, country or continent. Such types of comparison would not be appropriate because of (uncontrolled) differences in country characteristics, organizations and in the utilization of work reintegration measures. To compare individual country outcomes, one would have to adjust for these factors first, which goes beyond the scope of this study.

## Employers' RoI

Table 3.1 offers an overview of the average and median RoI rates for employers in the surveyed countries. Assuming small treatment effects, employers are assessed to receive a RoI of 1.7 on average over the two-year period (median=1.5). That means that as a result of cutting costs and increasing productivity in the long term, initial productivity losses are offset by 170 per cent; an overall dividend of 70 per cent or, equally, 35 per cent per annum. Given medium treatment effects, employers are estimated to increase their RoI to 3.7 on average (median=3.4) over the two-year period, while under the hypothesis of large treatment effects, the average RoI rises to 5.8 (median=5.1). Although the exact size of the treatment effect is unknown, these results further strengthen the idea that the benefits of work reintegration to employers outweigh the incurred costs. Already with the lowest possible assumption of treatment effects, the measures prove to be economically efficient. With a more effective rehabilitation system, it is possible to anticipate larger financial returns. To illustrate how intermediary results have been calculated and how individual costs and benefits are broken down for each actor, see Box 3.1 as well as the numerical example in Appendix I and the case study for Germany in Appendix II.

**Figure 3.1.** *Overview of return-on-investment factors for employers, social security and society*



**Box 3.1.** *Germany case study*

1,139,328 RtW measures per year

**Intermediary results**

- 212,566 prevented employment losses
- 14,059,124 prevented sick days per year

**Employer results**

- 35,707,704 productive working days gained over the evaluation period
- Increased productivity: EUR 3,130,538,450
- Reduction in recruitment costs: EUR 1,133,685,597
- Reduction in overtime cost : EUR 195,658,653
- Total benefits to employers: EUR 4,459,882,700
- Total costs to employers: EUR 1,712,102,023
- Return on investment: 2.60

**Social security results**

- Reduction in compensation expenditure: EUR 1,275,694,418
- Increased contribution collection: EUR 6,610,350,621
- Total benefits: EUR 7,886,045,040
- Costs incurred: EUR 5,749,458,828
- Return on investment: 1.37

**Societal results**

- Gained productivity: EUR 3,130,538,450
- Lost productivity: EUR 1,611,390,139
- Return on investment: 1.94

**Table 3.1.** *Employer return-on-investment results*

| | Employer | | |
|---|---|---|---|
| | Small scenario | Medium scenario | Large scenario |
| Mean RoI | 1.7 | 3.7 | 5.8 |
| Median RoI | 1.5 | 3.4 | 5.1 |

## Social security systems' RoI

With regard to the effects on social security systems' balance sheets, Table 3.2 gives an overview of the mean and median RoI rates. In the small scenario, social security systems are assessed to receive a RoI of 1.3 on average over the two-year period (median=0.8). Given medium treatment effects, social security systems are estimated to receive an average RoI of 2.9 (median=1.8), while under the hypothesis of large treatment effects, the average RoI rises to 4.2 (median=2.6).

**Table 3.2.** *Social security systems' return-on-investment results*

| Social security | | | |
|---|---|---|---|
| | Small scenario | Medium scenario | Large scenario |
| Mean RoI | 1.3 | 2.9 | 4.2 |
| Median RoI | 0.8 | 1.8 | 2.6 |

## Societal RoI

Table 3.3 shows the average and median RoI rates for society in the participating countries. In the small scenario, the economies are assessed to receive a RoI of 1.2 on average over the two-year period (median=1.1). Given medium treatment effects, productivity gains are estimated to outweigh the losses by a factor of 2.8 (median=2.5), while under the hypothesis of large treatment effects, the average RoI rises to 4.5 (median=3.8).

**Table 3.3.** *Societal return-on-investment results*

| Society | | | |
|---|---|---|---|
| | Small scenario | Medium scenario | Large scenario |
| Mean RoI | 1.2 | 2.8 | 4.5 |
| Median RoI | 1.1 | 2.5 | 3.8 |

# 4. Conclusion

This report aims to evaluate the costs and benefits of RtW measures and to estimate RoI rates for the main stakeholders involved. We have illustrated the economic potential of the provided measures using three scenarios, with each one reflecting a different simulated effect size. By drawing up financial balance sheets, we have estimated global RoI factors for employers, social security systems and society.

In spite of the restrictive assumptions used, the estimated balance sheets demonstrate the large economic potential of investing in work reintegration measures. Even with small treatment effects, the measures have on average a positive rate of return.

In the medium effectiveness scenario, **for every dollar invested, employers receive an average return of 3.7 times the initial investment.**

In other words, for expenditure on work reintegration and rehabilitation the average return-on-investment ratio for employers is 3.7.

Given the medium treatment effect scenario, social security systems receive an estimated average return-on-investment of 2.9.

From a societal perspective, productivity-related costs and benefits only are considered. In the medium effect-size scenario, the productivity gains outweigh the losses by an estimated factor of 2.8.

Under the hypothesized large effect size scenario, larger financial returns are likely. Despite the uncertainty with regard to the causal impact of the measures on economic activity and productivity, the results of this analysis support the view that effective rehabilitation measures on average “pay off”.

Given that the produced findings come from a limited number of countries and organizations, interpreting the results from this analysis requires a degree of caution. Future research should substantiate the estimated input parameters for which no empirical information was available. Nevertheless, the findings contribute substantially to the understanding of the economic consequences of work reintegration measures.

In conclusion, this report offers comprehensive results to understand more fully the economic effects of rehabilitation measures. These results suggest that policy-makers should encourage investments in RtW measures, even for cases where the anticipated effect size is likely to be small. On average, this leads to a positive return on investment for society, for the enterprises that employee the workers undergoing rehabilitation as well as for the social security systems that provide the measures. Everything else being equal, the bigger the effect size of interventions, the higher should be the financial return from such interventions. Accordingly, all economic actors have an interest in optimizing the provision of work reintegration services.

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# Appendix I.

## Model logic

The question of how to calculate the number of prevented employment losses as well as sick days is illustrated using the following hypothetical example.[9] Imagine that there are two possible outcomes, one with rehabilitation and one without. We are interested in how to statistically model the changes in prevented employment losses and prevented sick days. Given this, the results are as follows:

| | "With rehabilitation scenario" | | "Without rehabilitation scenario" | |
|---|---|---|---|---|
| | Employment | Number of sick days | Employment | Number of sick days |
| | 1 | 45 | 1 | 55 |
| | 1 | 50 | 1 | 65 |
| | 1 | 55 | 1 | 75 |
| | 1 | 60 | 1 | 75 |
| | 1 | 65 | 1 | 80 |
| | 1 | 70 | 1 | 80 |
| | 1 | | 0 | |
| | 1 | | 0 | |
| | 0 | | 0 | |
| | 0 | | 0 | |
| Working persons | 8/10 | | 6/10 | |
| Average number of sick days | | 57.5 | | 71.7 |

The changes in employment and the number of sick days are:

| | Employment results | | |
|---|---|---|---|
| Change in employment | 2 | (8-6) | |
| Relative risk increase | 33.3% | (80% / 60%)-1 | |
| Absolute risk increase | 20% | (80% - 60%) | |
| | Absolute change | | Relative change |
| Effect of rehab on number of average sick days | -14.17 | | -20% |
| Effect of rehab on absolute number of sick days | -85 | | -20% |

9. The monetary calculations presented in the Appendixes I, II and III are shown in euros (EUR).

A result that can be standardized into effect sizes:

| | With rehabilitation | Without rehabilitation | Difference/Pooled Stdev | Odds ratio |
|---|---|---|---|---|
| Odds of employment | 4:1 | 1.5:1 | | 2.7:1 |
| Average sicktime (days) | 57.5 | 71.7 | 14.2 | Cohen's d |
| Stdev of sickness absence | 8.5 | 9.0 | 11.3 | 1.26 |

*Note:* Stdev = Standard deviation.

This shows how both the employment effect and the effect on the number of sick days can be modelled together. In the hypothetical example above, **two prevented employment losses and 85 prevented sick days** per year would be taken into account to simulate the economic gains of the rehabilitation measures.

Given a two-year evaluation period with a ten-week friction period, an elasticity of labour supply of 0.2, EUR 4,000 recruitment costs, +50 per cent overtime rate, and EUR 2,000 average wage, the calculation of economic benefits is as follows:

Calculation of benefits: Absenteeism

(1). 2 prevented employment losses * 10 weeks * 7 days + 85 prevented sick days per year * 2 years = **310 days of absence prevented over 2 years**

To calculate the **monetary benefits, the days of absence prevented are divided into productivity losses** and days that could have been recovered at additional **overtime** costs:

(2). 310 days * (1-0.2) = loss of 248 productive workdays prevented
→ 248 * (2,000/30) = **EUR 16,533 additional productivity**

(3). 310 days * 0.2 = 62 days overtime pay prevented
→ 62 * ((2,000/30) * 50%) = **EUR 2,066 in overtime costs saved**

Additionally, recruitment costs linked to finding a replacement worker can be saved

(4). 2 x EUR 4,000 = **EUR 8,000 in recruitment costs saved**

Overall employer benefits in this example are equal to: EUR 16,533 + EUR 2,066 + EUR 8,000 = **EUR 26,599**

From the above calculation it is not trivial to calculate potential **benefits for social security systems**. Given a 40 per cent social security contribution rate on income, a 65 per cent short-term disability benefit rate, and a 35 per cent long-term disability benefit rate, the calculation is as follows:

**Increased contribution collection is calculated based on additional productivity** over the evaluation period:

(1). 40% * (248 * (2,000/30)) = 40% * EUR 16,533 = **EUR 6,613 increased contributions**

**Prevented workers' compensation pay is calculated based on prevented employment losses** and **sick days** over the evaluation period (two years):

(2). 35% * (2 * (2,000 * 12)) * 2 = **EUR 33,600 prevented long-term compensation pay**

(3). 65% * (85 * (2000/30)) * 2 = **EUR 7,366 prevented sick pay**

**Overall social security system benefits** in this example are equal to:

EUR 6,613 + EUR 33,600 + EUR 7,366 = **EUR 47,579**

The economic model used in the main section of this report applies the same properties for each type of rehabilitation measure and scenario. It should be borne in mind that this kind of modelling is based on a set of specific input factors and assumptions. This includes also the assumption that additionally reintegrated workers do not exhibit more sick days than the average regular worker. If they were to have more sick days, the gains in productivity and cost reductions calculated with this model would need to be corrected downwards.

# Appendix II.

## Case study: Germany

To give a real life example, we present the results of the pilot study in Germany.

In total, the study surveyed seven organizations in Germany that provide rehabilitation and reintegration measures to injured workers and workers absent on health grounds. Of these, six are workers' compensation insurance agencies providing accident insurance to 31 million working persons. The other surveyed organization is responsible for pension insurance and provides insurance for non-work related accidents and illnesses to more than 36 million workers. Together, they invest close to EUR 5.75 billion in rehabilitation and return-to-work (RtW) measures targeted at the work reintegration of injured workers or workers absent on health grounds.[10] In particular, the organizations reported to have carried out 1,139,328 RtW measures, enabling 84 per cent of those who have undergone rehabilitation to return to work. In detail, the organizations have provided:

- 141,147 ambulatory rehabilitation measures
- 850,339 stationary rehabilitation measures
- 147,842 vocational rehabilitation measures

### *The medium effect size scenario*

Using the control event rates as specified in this report's data and methods section (75 per cent for ambulatory, 60 per cent for stationary and 45 per cent vocational rehabilitation), changes in employment are simulated. This is done by multiplying the number of measures in each category with the absolute risk increase. As such in the medium scenario, we use 13.2 per cent, 18.9 per cent and 22.2 per cent as multipliers for ambulatory, stationary and vocational rehabilitation measures, respectively.

All absent workers whose employment status is not changed, but who do return to work after participating in a measure, are simulated to experience an improvement in their yearly level of sick-day absences. If the baseline RtW rate is assumed at 75 per cent, as for the ambulatory rehabilitation measures, the number of ambulatory rehabilitation measures is multiplied by 0.75 and by 14 (the number of prevented sick days in the medium scenario as specified in Table 2.5).

In the medium effect size scenario, the following impacts are estimated for ambulatory, stationary and vocational rehabilitation measures, respectively:

The 141,147 ambulatory rehabilitation measures assessed result in:

- 141,147 * 13.24% = 18,681 prevented employment losses
- 141,147 * 75% * 14 = 1,482,044 prevented sick days per year

10. Data from worker compensation insurance does not include ambulatory rehabilitation cases, as a clear distinction between acute phase and rehabilitation is not possible. Thus, only stationary rehabilitation measures and vocational rehabilitation are assessed. Data from pension insurance also includes ambulatory rehabilitation cases as a clear distinction is possible.

The 850,339 stationary rehabilitation measures assessed result in:

- 850,339 * 18.95% = 161,117 prevented employment losses
- 850,339 * 60% * 21 = 10,714,271 prevented sick days per year

The 147,842 vocational rehabilitation measures assessed result in:

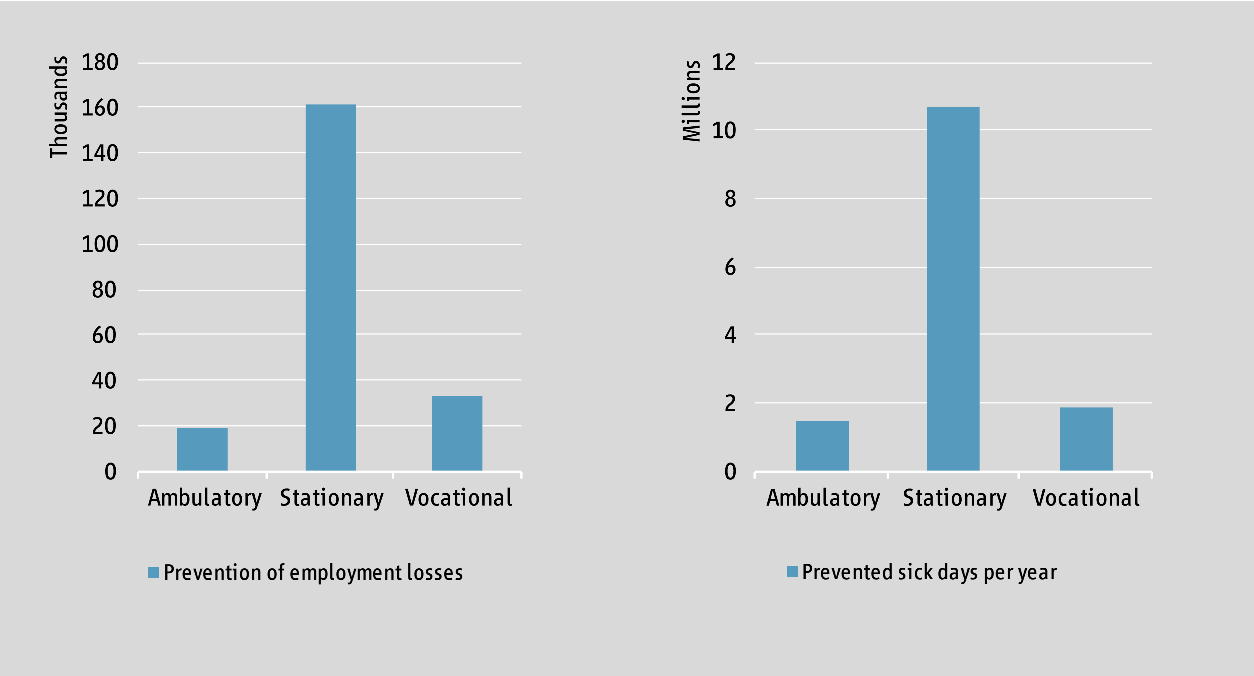
- 147,842 * 22.16% = 32,768 prevented employment losses
- 147,842 * 45% * 28 = 1,862,809 prevented sick days per year

**Together, 212,566 employment losses and 14,059,124 sick days per year are prevented** by the application of medium-effect size measures. Table A2.1 and Figure A2.1 provide an overview of the attained prevented number of employment losses and sick days for each field of rehabilitation.

**Table A2.1.** *Germany: Prevention of employment losses and sick days*

| | Prevention of employment losses | Prevented sick days per year |
|---|---|---|
| Ambulatory rehabilitation | 18,681 | 1,482,044 |
| Stationary rehabilitation | 161,117 | 10,714,271 |
| Vocational rehabilitation | 32,768 | 1,862,809 |
| **Total** | **212,566** | **14,059,124** |

**Figure A2.1.** *Germany: Prevention of employment losses and sick days*



### *Return-on-investment analysis for employers*

To analyse the financial returns of the impact for the stakeholders involved, the friction cost method is employed with the following parameters:

- Friction period: 11.1 weeks[11]
- Partial output elasticity of labour: 0.20[12]
- Cost of overtime: 125 per cent[13]
- Monthly wage: EUR 2,666
- Cost per hire of replacement (two months' salary): EUR 5,332

*Employer benefits.* For every prevented employment loss a friction period equal to 11.1 weeks (or 77.7 days) on average is simulated. This amounts to more than 16.51 million calendar days in this example (212,566 * 77.7). Additionally, the prevention of sick days over two years accumulates to more than 28 million calendar days (14,059,124 * 2). Table A2.2 gives an overview of the effects days of employment and productivity.

As it is expected that not all productivity is lost when a worker is absent from work, the results are reduced according to the partial output elasticity of labour assumed. A partial output elasticity of 0.2 implies that productivity is expected to be reduced by 80 per cent, while co-workers can recover 20 per cent. Accordingly, the productivity gain resulting from the rehabilitation measures carried out equals more than 35.7 million productive work days (44.6 million * 0.8).

**Table A2.2.** *Germany: Productivity-related effects of the measures*

| | Employment effect | Absenteeism | Total |
|---|---|---|---|
| Gained days of employment over 2 years | 16,516,382 | 28,118,248 | **44,634,630** |
| Productive working days gained over 2 years | 13,213,106 | 22,494,599 | **35,707,704** |

Valued at EUR 88 per day, employers are able to increase productivity by EUR 3.13 billion through the application of work reintegration measures (Table A2.3). Additionally, expenditure can be reduced by EUR 1.1 billion and EUR 0.35 billion, respectively, as the number of recruitments of new workers and the number of overtime work-hours required falls. The size of the recruitment costs saved is the product of the cost per hire times the number of prevented employment losses (EUR 5,332 * 212,566 = EUR 1,133,402,175). The amount of overtime costs saved is determined by the product of the overtime rate, the daily wage, the number of gained days of employment over the evaluation period and the partial output elasticity of labour (25% * (32,000/365) * 44,634,630 * 0.2 = EUR 195,658,653). **The total benefits for employers** with regard to the work reintegration measures assessed **accumulate to EUR 4.459 billion**.

11. Rebien, Kubis, and Müller (2014).

12. Marquetti (2007).

13. Oaxaca (2014).

*Employer costs.* On the cost side, the 1,139,328 RtW measures cause a substantial loss in the number of working days for employers as the workers undergoing rehabilitation are on average absent for 30 days during the rehabilitation period (20 days for ambulatory, 29 for stationary and 91 days for vocational measures). Similarly, as the gain in sick days is limited to those who would be working afterwards, the loss in working time is limited to those who are assumed to be working also without rehabilitation; i.e. all participants below the control event rate for return to work. With regard to ambulatory rehabilitation measures, the cut-off point is still set at 75 per cent, while for stationary rehabilitation it is 60 per cent, and for vocational rehabilitation measures it is 45 per cent. Accordingly, out of a 100 workers undergoing rehabilitation, 75, 60 and 45, respectively, the three types of rehabilitation are considered to cause their employer to have a real loss in working days. The amount of production lost and the amount of overtime costs incurred depend again on the (inverse of) the elasticity of labour and on the specified overtime rate.

As one example, for ambulatory rehabilitation:

- Production lost: (141,147 * 75% * 20) * 0.8 * (32,000/365) = EUR 118,795,505
- Overtime pay: (141,147 * 75% * 20) * 0.2 * ((32,000/365) * 25%) = EUR 9,280,899

The same calculations are carried out for stationary and vocational rehabilitation measures. Taken together, an equivalent of EUR 1.6 billion in production is lost while EUR 0.1 billion in overtime cost is needed to recover some of the otherwise also lost production. **The overall costs to employers in Germany accumulate to EUR 1.71 billion**. When comparing the benefits with the costs – that is EUR 4.459 billion over EUR 1.71 billion. **The monetary benefits realized from investing in rehabilitation outweigh the costs, with a ratio of 2.60** in this scenario (Table A2.3).

**Table A2.3.** *Germany: Employer benefits and costs*

| Benefits (in EUR) | Employment effect | | Absenteeism | | Total | |
|---|---|---|---|---|---|---|
| Productivity gained | EUR | 1,158,409,261 | EUR | 1,972,129,189 | EUR | 3,130,538,450 |
| Recruitment costs saved | EUR | 1,133,685,597 | | | EUR | 1,133,685,597 |
| Overtime costs saved | EUR | 72,400,579 | EUR | 123,258,074 | EUR | 195,658,653 |
| Total | EUR | 2,399,677,961 | EUR | 2,095,387,263 | **EUR** | **4,459,882,700** |
| Costs | | | | | | |
| Productivity lost during rehabilitation | | | | | EUR | 1,611,390,139 |
| Overtime costs during rehabilitation | | | | | EUR | 100,711,884 |
| **Total** | | | | | **EUR** | **1,712,102,023** |
| Return on investment | | | | | | |
| RoI ratio | | | | | | **2.60** |

### *Return-on-investment analysis for social security systems*

To determine the RoI for social security systems, the country specific social security contribution rate on income as well as daily and yearly workers' compensation rates are determined based on the secondary literature:

- Social security contribution rate on income 41 per cent[14]
- Work compensation rate for short-term disability 70 per cent[15]
- Work compensation rate for long-term disability 35 per cent[16]

Given the previously estimated number of prevented employment losses and prevented sick days and productive workdays gained (Table A2.4), benefits to the social security systems can be calculated. For every prevented employment loss, compensation payments are reduced equal to 35 per cent of the average yearly wage for a period of two years. Similarly, for every prevented sick day, compensation payments equal to 70 per cent of daily wages are prevented. Moreover, the German social security system profits from increased contribution collection. For every productive workday gained, 41 per cent of daily wages are added to the social security providers' budgets. According to this study's model, compensation expenditure is reduced by EUR 1.275 billion, while contributions are increased by EUR 6.6 billion. **In total, the monetary benefit equals EUR 7.9 billion.**

The costs for social security providers have been surveyed via questionnaires completed by the insurance providers. The costs include those for treatments as well as compensation expenditure incurred during rehabilitation services. In total, the accumulated costs for the applied RtW measures equate to EUR 5.749 billion. Comparing the costs with the benefits, a **return on investment of 1.37** is attained in this scenario.

**Table A2.4.** *Germany: Social security system benefits and costs*

| Benefits (in EUR) | Employment effect | | Absenteeism | | Total | |
|---|---|---|---|---|---|---|
| Reduced compensation | EUR | 472,051,774 | EUR | 803,642,644 | EUR | 1,275,694,418 |
| Increased contributions | EUR | 4,761,479,507 | EUR | 1,848,871,115 | EUR | 6,610,350,621 |
| Total | EUR | 5,233,531,281 | EUR | 2,652,513,759 | **EUR** | **7,886,045,040** |
| Costs | | | | | | |
| Direct costs as surveyed | | | | | **EUR** | **5,749,458,828** |
| Return on investment | | | | | | |
| RoI ratio | | | | | | **1.37** |

14. SSA and ISSA (2015b).
15. SSA and ISSA (2015a).
16. Authors' estimate.

### *Return-on-investment analysis for society*

Only productivity-related costs/benefits are taken into account – transfer payments between agents in an economy cancel each other out. While EUR 3.1 billion in productivity is gained, EUR 1.6 billion is lost as a result of the time spent in the measures (Table A2.5). This gives a return on investment for society of 1.94 times the initial investment. In terms of productive workdays gained, that is equivalent to 35,707,704 versus 22,974,898.

**Table A2.5.** *Germany: Societal benefits and costs*

| Benefits (in EUR) | Employment effect | | Absenteeism | | Total | |
|---|---|---|---|---|---|---|
| Gained productivity | EUR | 1,158,409,261 | EUR | 1,972,129,189 | **EUR** | **3,130,538,450** |
| Costs | | | | | | |
| Lost productivity | | | | | EUR | 1,611,390,139 |
| **Return on investment** | | | | | | |
| RoI ratio | | | | | | **1.94** |

# Appendix III.

## Additional information on the calculation tables

The following tables provide an overview of the impact of alternative control event rates on the size of the assumed intervention effects. Hereby, the relative intervention effect is held constant across the small, medium and large scenario, respectively.

In a first step, the relative risk (RR) increase for fixed odds ratios (OR) given a range of baseline risks is calculated (Table A3.1). Figure A3.1 presents the result. With a larger control event rate (CER), the relative risk increase, given a constant odds ratio relationship, decreases. In other words, when the control event rate is large, a smaller relative risk increase is needed to improve the employment odds in the same way as for smaller control event rates.

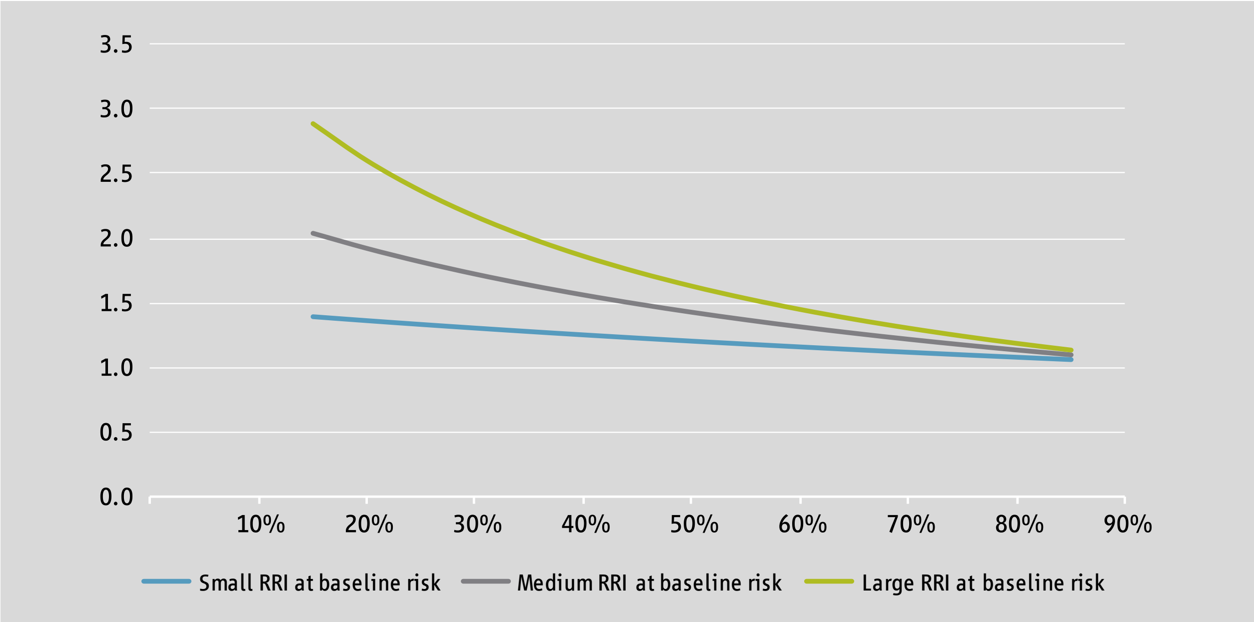
The relationship of the variables is: RR = OR / ((1 - CER) + (CER * OR)).

**Table A3.1.** *Relative risk increase of return to work after intervention*

| | Small scenario OR=1.5 | Medium scenario OR=2.5 | Large scenario OR=4.3 |
|---|---|---|---|
| Baseline RtW Risk (CER) | RR at baseline | RR at baseline | RR at baseline |
| 15% | 1.40 | 2.04 | 2.88 |
| 20% | 1.36 | 1.92 | 2.59 |
| 25% | 1.33 | 1.82 | 2.36 |
| 30% | 1.30 | 1.72 | 2.16 |
| 35% | 1.28 | 1.64 | 2.00 |
| 40% | 1.25 | 1.56 | 1.85 |
| 45% | 1.22 | 1.49 | 1.73 |
| 50% | 1.20 | 1.43 | 1.62 |
| 55% | 1.18 | 1.37 | 1.53 |
| 60% | 1.15 | 1.32 | 1.44 |
| 65% | 1.13 | 1.27 | 1.37 |
| 70% | 1.11 | 1.22 | 1.30 |
| 75% | 1.09 | 1.18 | 1.24 |
| 80% | 1.07 | 1.14 | 1.18 |
| 85% | 1.05 | 1.10 | 1.13 |

*Notes:* CER = Control event rate; OR = Odds ratio; RR = Relative risk; RtW = Return to work.

**Figure A3.1.** *Relative risk at different RtW probabilities with constant odds ratio*



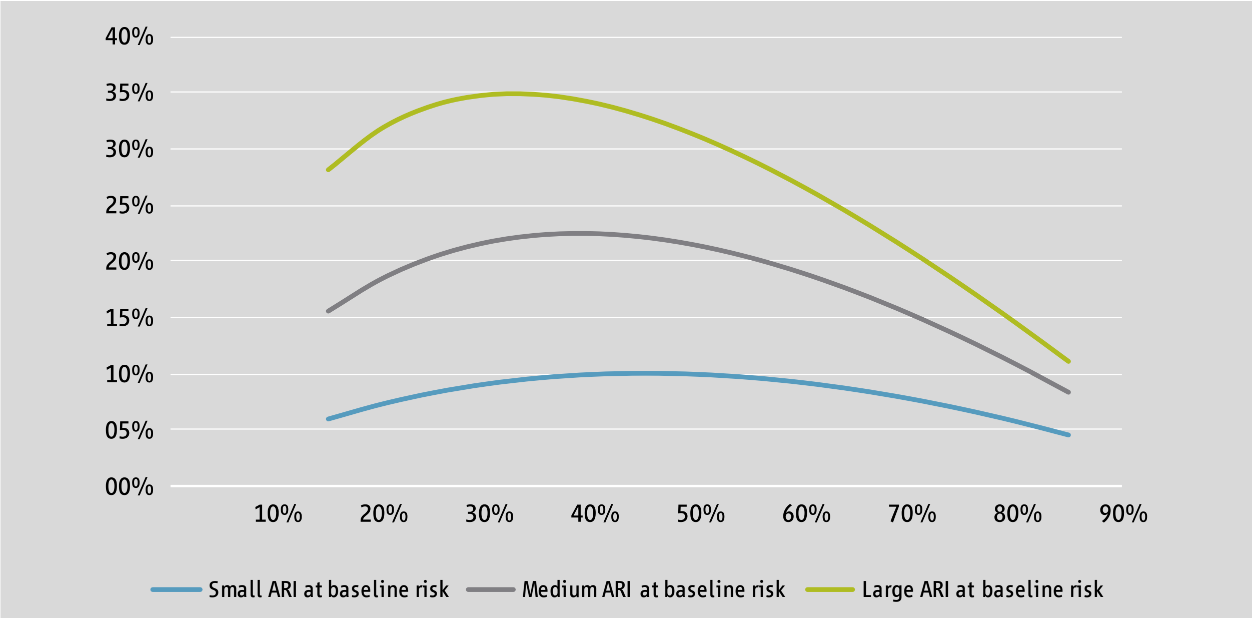

In a second step, the resulting relative risk increases are multiplied with their respective baseline risks to receive the absolute risk increase (ARI) for each baseline RtW risk (Table A3.2). The highlighted values are the assumed baseline risks and intervention effects for ambulatory, stationary and vocational rehabilitation, respectively. Figure A3.2 shows the result. The absolute risk increase is largest around the mid-point of the distribution. For very high and low baseline values, smaller changes in employment are considered to be of the same effect size.

**Table A3.2.** *Relative risk increase of return to work after intervention (percentage)*

| | OR=1.5 | OR=2.5 | OR=4.3 |
|---|---|---|---|
| Baseline RtW Risk (CER) | Small ARI at baseline | Medium ARI at baseline | Large ARI at baseline |
| 15 | 5.9 | 15.6 | 28.1 |
| 20 | 7.3 | 18.5 | 31.8 |
| 25 | 8.3 | 20.5 | 33.9 |
| 30 | 9.1 | 21.7 | 34.8 |
| 35 | 9.7 | 22.4 | 34.8 |
| 40 | 10.0 | 22.5 | 34.1 |
| 45 | 10.1 | 22.2 | 32.9 |
| 50 | 10.0 | 21.4 | 31.1 |
| 55 | 9.7 | 20.3 | 29.0 |
| 60 | 9.2 | 18.9 | 26.6 |
| 65 | 8.6 | 17.3 | 23.9 |
| 70 | 7.8 | 15.4 | 20.9 |
| 75 | 6.8 | 13.2 | 17.8 |
| 80 | 5.7 | 10.9 | 14.5 |
| 85 | 4.5 | 8.4 | 11.1 |

*Notes:* ARI = Absolute risk increase; OR = Odds ratio; RtW = Return to work.

**Figure A3.2.** *Absolute risk increase of return to work at different baseline probabilities*

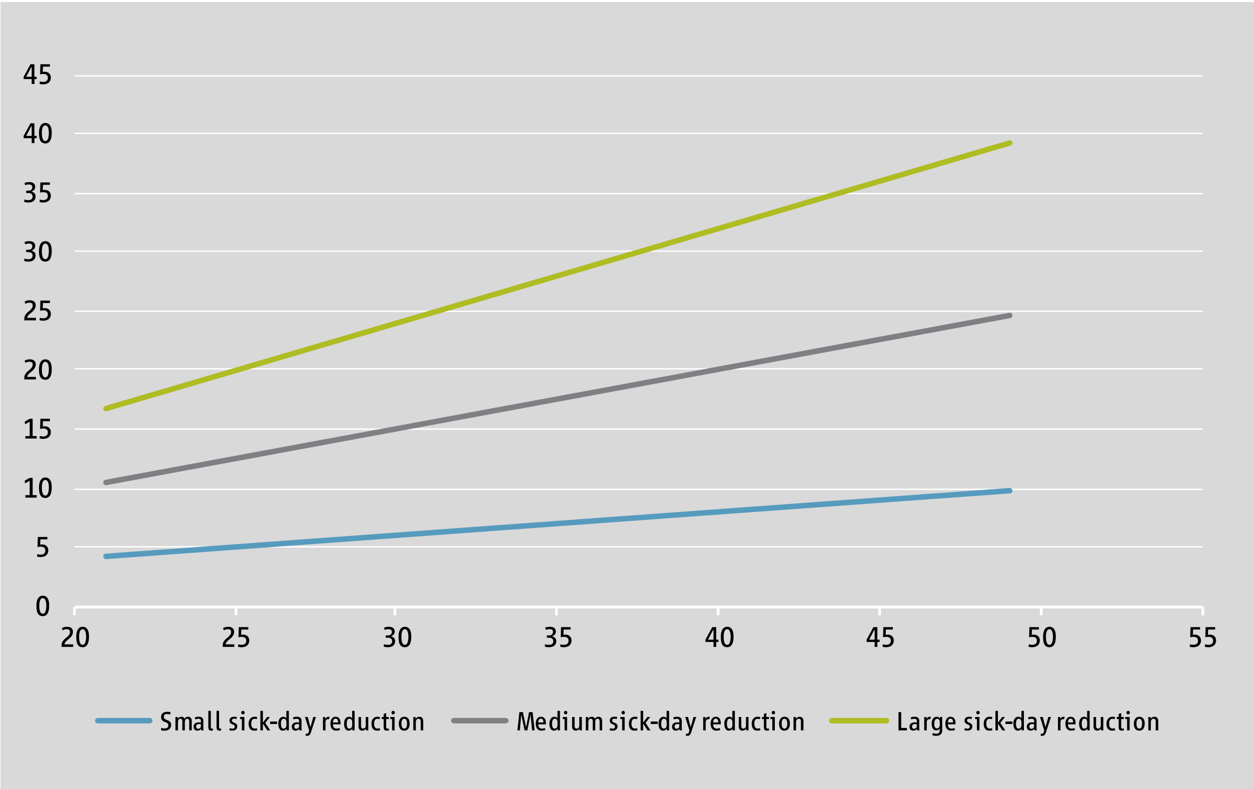



With regard to the changes in the number of sick days, the calculation is straightforward. The absolute intervention effects were retrieved by multiplying the effect size (ES) with the absenteeism baseline value. With a higher anticipated baseline standard deviation, the expected sick-day reduction for a given ES increases. The highlighted numbers are the assumed baseline and intervention effects for ambulatory, stationary and vocational rehabilitation, respectively (Table A3.3; Figure A3.3).

**Table A3.3.** *Absolute number of sickness days prevented after the intervention*

| | d=0.2 | d=0.5 | d=0.8 |
|---|---|---|---|
| Absenteeism baseline value (standard deviation) | Small sick-day reduction | Medium sick-day reduction | Large sick-day reduction |
| 14 | 3 | 7 | 11 |
| 21 | 4 | 11 | 17 |
| 28 | 6 | 14 | 22 |
| 35 | 7 | 18 | 28 |
| 42 | 8 | 21 | 34 |
| 49 | 10 | 25 | 39 |
| 56 | 11 | 28 | 45 |
| 63 | 13 | 32 | 50 |
| 70 | 14 | 35 | 56 |
| 77 | 15 | 39 | 62 |
| 84 | 17 | 42 | 67 |

**Figure A3.3.** *Absolute number of sick-day reductions at different baseline absence rates*



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