REMUNERATION OF EMPLOYEE INVENTIONS AT CZECH UNIVERSITIES

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Abstract: *Universities have recently been facing pressure to increase the share of commercialized R&D results, as well as to manage their intellectual property rights responsibly, including the remuneration of employee-inventors. The paper brings the first overall evidence of monetary incentives and rewarding schemes for employee inventors at Czech universities. The analysis is based on the data of 15 Czech public universities, which account for 98.7% of the patenting activity of all Czech universities. We perform a content analysis of their internal guidelines, explore and discuss how they interpret and apply key categories of broad legal framework defined by the Czech patent law. We found that each university complies formally with the law and has some remuneration system for employee inventors. Most of the schemes are combined, paying employees a certain initial reward and share in income from future technology commercialization. Although there is some common ground, we found many creative approaches across the sample in particular remuneration elements.*

Keywords: *Employee Inventions, Monetary Incentives, Reward, Royalty-sharing, Patents.*

JEL Classification: *O31, O34, I23, J33, M52*

Introduction

Intangible assets such as patents, trademarks, trade secrets, utility models, industrial designs copyrights and software, commonly called intellectual property rights, have become of a noticeable importance in the global marketplace in the last few decades. One of the main reasons of this phenomenon lies in a growing global competition that forces companies and individuals to look for solid competitive advantages. Investments into intangible assets (e. g. invention) could be the source of such an advantage (Lev, 2001). Intangible assets are commercially used mostly by various organizations; however, it is a result of their employees' intellectual creativity. The World Intellectual Property Organization statistics (WIPO, 2016) show that 80-90 per cent of patent applicants are organizations (corporations, universities, research institutions). This value shows an approximate share of inventions conceived through the employee-employer relationships. In our paper, we bring an evidence of how Czech universities motivate their employee inventors by monetary rewards, and, at the same time, how they interpret the legal obligation to remunerate adequately their employee inventors. The paper is divided into the following chapters: Chapter 1 provides an overview of the literature, chapter 2 describes legal aspects of monetary incentives, explaining "employee inventions" in the Czech patent law, chapter 3 describes data and methodology, chapter 4 presents main results and discussion in relation to Czech patent law, chapter 5 concludes the paper.

1 Monetary incentives for university inventors

1.1 Literature review

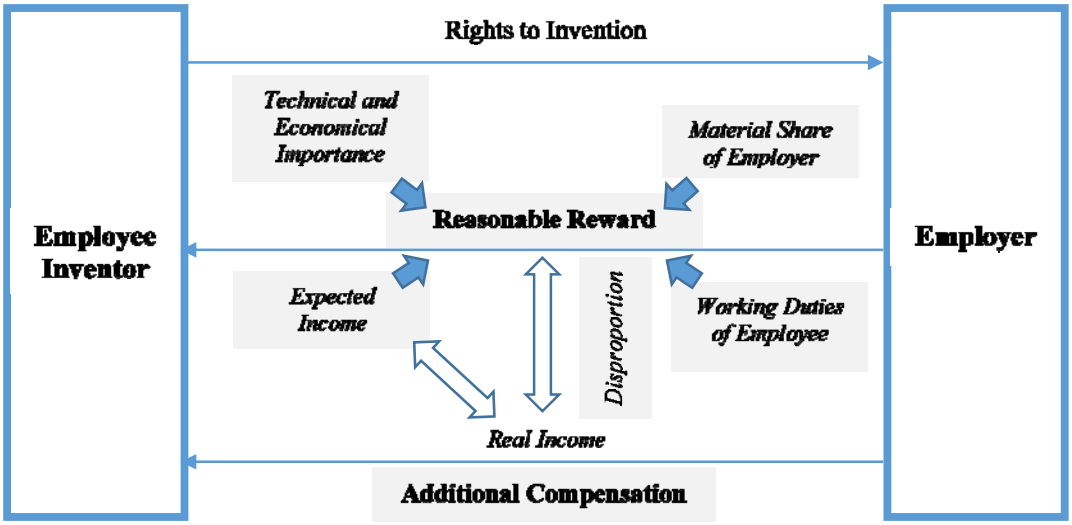
In the last few decades, there has been a growing pressure on universities to commercialize their research and development (R&D) results (Bubela and Caulfield, 2010), as the universities can be an important supplier of discoveries to the market for innovations (Markman et al., 2009). The beginning of this trend could be dated back to 1980s' when the United States' (U.S.) adopted the Bayh-Dole Act. The Act provides patent rights to certain inventions arising out of government-sponsored R&D to non-profit institutions and small businesses with the expressed purpose of encouraging the commercialization of new technologies through cooperative ventures between and among the research community, small firms, and industry (Debackere and Veugelers, 2005). To bridge the gap between academic and industry, universities established technology transfer offices (TTO), giving them a responsibility for the technology transfer process (Bubela and Caulfield, 2010; Debackere and Veugelers, 2005). Hand by hand with TTOs, universities started adopting various incentive systems to motivate the academicians in producing new ideas and to be engaged in the commercialization process. This trend spread later to other countries, as well (Baldini et al., 2014; Bubela and Caulfield, 2010; Grimm and Jaenicke, 2012). The Czech Republic followed this trend mainly through the statutory unbundling of public research institutions by Act No. 341/2005. To motivate the academics, universities across the world have adopted rewarding systems. The overall picture is evidenced for the U.S. universities: Bowers and Leon (1994) made a patent policy comparison of 65 U.S. universities, later (Lach and Schankerman, 2008) provided another view on royalty-sharing schemes at U.S. universities, separately for public and private ones. Baldini et al. (2014) offer a complex picture of Italian university patent policies, Barjak et al. (2015) evidenced that most of the European universities and research institutions provide income-sharing arrangements for their employee inventors. An older evidence for United Kingdom is offered by Handscombe (1996), however, there has been a lack of papers focusing on other countries' universities patent policies. Then, the research focused on identifying and measuring factors important for successful technology commercialization. The rewarding system was identified and measured as one of the most critical factors mostly on U.S. data (Friedman and Silberman, 2003; Lach and Schankerman, 2008; Link and Siegel, 2005; Siegel et al., 2003), the evidence pro Italy suggests positive impact of royalty-sharing arrangements on patenting and licensing activity (Baldini, 2010), the results from the Spanish and Portuguese data are not so convincing (Arqué-Castells et al., 2016).

1.2 Legal framework for monetary incentives in the Czech Republic

In addition to the incentive effect, many countries regulate the remuneration of inventions made by employees through their national patent law, calling them "employee inventions". The law works generally as follows: The employee invents an idea, must bring it to the employer in a prescribed form and the employer decides whether he will use it or not. Eventually, the employer applies for a patent (or utility model, or keeps the idea secret) later. In many patent systems, this employee-employer transfer of rights is balanced by the legal obligation of employers to pay a reasonable reward to employee inventors. In this respect, legal frameworks and the overall

attitudes of the individual countries greatly differ (Peberdy and Strowel, 2010; Wolk, 2011). Moreover, in many countries there is a real controversy how what amount is reasonable (Taplin, 2008; Wolk, 2011). In the Czech Republic, the legal framework is defined in the Patent Act, No. 527/1990, par. 9-10 ('Patent law'). The overall principle is described in Fig. 1.

Fig. 1: Czech regulatory framework for remuneration of employee inventions



Source: Compiled by the authors from the Czech patent law.

In case the Czech employer exercises this option (within 3-month period), he must pay a reasonable reward to the employee. The factors to be evaluated are: (1) technical and economical importance of the invention, (2) expected income from the invention, (3) material share of the employer and (4) extent of employee's working duties. If the reward paid becomes visibly disproportional to the future (real) employer's benefit obtained from exploitation or other subsequent use of the invention, the employee should get an additional compensation. Therefore, the Patent law offers only a very broad framework in this matter. More detailed framework is (or should be) specified by the internal guidelines of companies and other institutions. However, such guidelines are not legally binding. There is no overall public information whether they have or have not such guidelines. Recently, there has been a strong legal incentive in the Czech Republic to adopt such internal rules, especially for many public and private entities which support their R&D activities from public sources (Law No. 130/2002 on Public Support of Research and Development, par. 16-3). This applies to universities which use public sources on R&D in large volumes (45% of public sources for public universities in 2014 - data from Czech Statistical Office). So far, there has been no overall evidence about remuneration policies of Czech universities and other institutions. This paper tries to fill this gap.

2 Research question, data sampling and methods

Given that, (i) the inventions are one of the key sources of competitive advantage, (ii) decisive part of the inventions is created within employee-employer relationship, (iii) the Czech patent law orders remuneration of employee invention, (iv) monetary incentives matter for commercialization outputs of universities across the world, (v) Czech universities are forced to regulate appropriately handling with their intellectual properties, (vi) there is a lack of evidence from Czech universities, (v) there is a

"international" controversy what reward is reasonable, in our exploratory paper, we follow a simple research question:

"How do Czech universities interpret the reasonable remuneration for employee inventors?"

We search for the answers by analyzing the internal guidelines of Czech universities. Specifically, we study these internal guidelines in the context of the general regulatory framework. This framework (described in Fig. 1 above) defines a few identifiable categories that should be used to deliver "reasonable remuneration". Such a regulatory setting enables universities using a portion of creativity in interpreting the central category and studied phenomenon "reasonable remuneration". Such creativity is expected to be, for example, in different structuring of rewards, different defining of income, different incorporation of legal criteria, etc.

The aim of the paper is to contribute to defining the phenomenon "reasonable remuneration" in the context of Czech legal framework. Methodologically, we perform a qualitative empirical methodology – a content analysis (Krippendorff, 2004) of these internal guidelines to discuss and interpret how universities reward employee-inventors and, at the same time, how they comply with the legal obligation to adequately reward their framework employee inventors. Technically, we analyze the broad text of the guidelines, which regulate many areas related to handling with intellectual properties. We first code patterns of information attributable to the studied phenomenon, then restructure or split these categories into newly created (more detailed) ones, so that we provide a more plastic view on comparable attributes of remuneration systems across the sample. Finally, we aim at providing common or rare and creative elements constituting "reasonability" of remuneration systems, as well as address controversial issues discovered.

The key primary data for our research - internal university directives - was obtained partly from university websites, partly via e-mails addressed to the responsible persons at the universities (under a promise of anonymity). We work only with public universities as the private ones do not have a long tradition in the Czech Republic and, consequently, they do not have rich R&D activities. The whole population of public universities in the Czech Republic is 26, however, our sample of 15 represents 98.7% share of the universities' patenting activity, measured by cumulative number of national patent applications by universities between 2002-2011 as reported by (Eliáš 2012). Therefore, the sample seems representative for the whole number of universities. Collected guidelines are dated between 2008 and 2016, some of them are actualized versions of earlier adopted rules. Other data used for interpreting purposes comes from the Czech Industrial Property Office and the Czech Statistical Office.

As a part of the analysis, we made a limited, international reasonability check of income-sharing rewards. For this reason, we gathered a convenience sample of 28 U.S., 17 U.K., 4 German and 3 Dutch universities' remuneration systems. Unlike the key data from Czech universities, the information about foreign universities has limited role in this paper. The sources of this information were relevant available university websites (for detailed list see Reference section). When the text uses term "universities" or "institutions" without any other attribute, it is Czech universities.

3 Results and discussion

The key coded data are displayed in a tabulated manner (Miles et al., 2014) in Tab. 1. Analyzes are based on either 15 or 14 institutions (university 14 provided only partial data). The analysis revealed the following thematic categories illuminating the phenomenon of the "reasonableness" in the Czech context: **(i) Existence and character of a remuneration system for employee inventions, (ii) Timing of the initial part of the reward, if any, (iii) Implementation of statutory factors in calculating the remuneration, (iv) Methods of calculating and amounts of initial reward, (v) Type of income-based systems, (vi) Share of income for inventors, (vii) Definition of income from invention, (viii) Statutory deductions from income.**

3.1 Existence and character of remuneration systems

Each of the universities studied has some system for remunerating employee inventions, therefore, no university in the sample challenges the legal right of their employees. In addition, universities 4 and 10 ensure that this reward is independent of other rewards resulting from employment relationships (this fact not displayed in Tab. 1). Most universities (86%, n = 14) implemented a two-phase reward system. The first reward is a certain initial, usually fixed, amount, the second reward depends on the income from the future commercialization of the invention. Therefore, most universities interpret a reasonable remuneration basically as a two-step process. Compared internationally, foreign universities in our sample pay usually only the income-based rewards. The two-tier system at Czech universities can therefore be considered as specific, influenced by the Patent law framework.

No university offers only one initial reward remuneration. Conversely, there are two universities (14%) in the sample (2 and 13), which offer only the income-based reward. The question is whether these universities are effectively compliant with the Patent Law, since a closer look shows that university 2 has 0.7% of licensed valid patents and utility models, university 13 has no license (sample average = 4.5% see column 2 in Tab. 1). Thus, the inventor of these institutions has, on average, only a 0.4% chance of getting some reward, even if the university has legally exercised the rights to his inventions.

Almost half of the universities (six of them, 43%) offer a special reward in addition to two parts of the reward - 5 of these universities (2, 5, 6, 7, 8) offer the inventor an opportunity to acquire the invention. This option applies if the university is unable to commercialize the invention itself (3-year and 5-year periods are mentioned). 1 university (11) offers an extra fixed reward for the active participation in the commercialization process. Such a right is also used at some U.S. universities (Goswami, Armstrong, 2016).

This option can be generally considered as a valuable right, especially when Czech universities have a very low degree of commercialization of their patents and most inventions are not commercialized ever (see col. 2 in Tab. 1 for individual licensing productivity). Thus, formally, we can call these systems "three-level" (initial, income, option). However, it is doubtful how valuable this option is for an individual inventor if the university itself does not find a business partner within several years.

Tab. 1: Key university data

Uni	Licensing Prod'vity	Type of scheme	Initial reward value	Initial reward timing	Factors affecting reward	Specifics rights of employees/employers	Income sharing mechanism	Income definition	Income deductions/definitions	Inventors' share	Other reward explanations	Health/social insurance/taxes
1.	1.5%	Combined	min 10.000 CZK	Rights exercise	2 legal	Employer - free for non-commercial use for not exercised inventions.	Degressive	Net income	Direct costs	100 % up to 1 mil., min 50% above 1 mil.	Initial called "motivating ".	Not defined
2.	0.7%	Income-based	-	-	-	Employee - option to buy 5Y.	Linear	Net income	Direct cost. Income = external use.	50%	-	Not defined
3.	8.2%	Combined	5.000 CZK (per IP)	Rights grant	Not defined (implicitly 1 legal)	Not defined	Linear	Net income	Direct costs/overhead wages	65%	Income-based called "additional".	The reward contains all social and health payments on both employee and employers side.
4.	3.8%	Combined	Dean's decision	Not defined	Not defined	Not defined	Degressive	Net income	Direct costs incl subsidies. Improvements income cumulated together.	55 % up to 1 mil, 40 % 1-5 mil, 25 % above 5 mil.	Income-based called "additional ".	Not defined
5.	3.8%	Combined	1.000-10.000 CZK	Rights exercise	4 legal	Employee - option to buy 5Y.	Linear	Gross income	Not defined	45%	Income-based called "additional ".	Social/health/taxes are deducted as from common salary.
6.	2.1%	Combined	100 - 1000 CZK	Rights exercise (up to 3M)	4 legal	Employee - option to buy.	Degressive	Gross/Mixed income	Income = incl. initial FV of shares in spin-offs. Dividends above FV not inc. Other income = NOT option fees.	65 % up to 1 mil., 35 % from 1-5 mil, 25% from above 5 mil.	Income-based called "additional ". No additional = inventor gets > 5 % on Co.	No deductions from initial reward. All deductions (social/health employee/employer, tax) from additional reward. Additional reward = personell costs.
7.	1.3%	Combined	900 - 48000 CZK	Rights exercise (up to 2M)	4 legal	Employee - option to buy.	Degressive	Net income	Direct costs. Income = royalties, assigments, dividends from spin-offs, J/V.	80 % up to 1 mil., 70% above 1 mil.	Income-based called "additional ".	Not defined
8.	12.4%	Combined	min 10.000 CZK	Not defined	2 legal fix/2 legal considered for additional compensation)	Employee - option to buy 3Y.	Degressive	Net Income	Direct costs + initial reward + overhead. Income = royalties, assignments, services etc.	70 % up to 2 mil., 35% above 2 mil.	Initial called "motivating". Income-based reward called "additional ".	Gross salary for inventor; in case of finished employment contract, invoiced income. Initial reward = salary component.
9.	5.1%	Combined	4.000-10.000 CZK	Rights exercise	4 legal	Not defined	Linear	Net Income	Not defined	25%	Income-based called "reward from using".	Not defined
10.	15.2%	Combined	Dean's decision	Not defined	Not defined	Not defined	Degressive	Net income	Direct costs minus subsidies. Income = royalties and other income. Institutional or other public subsidies not Income. Improvements income cumulated together.	70 % up to 100K, 55 % up to 1 mil., 40% above 1 mil.	Income-based called "reward from using", as well as "additional ".	Not defined

11.	6.3%	Combined	max. 5.000 CZK	Not defined	Not defined	Specific reward for engagement in the commercialization.	Linear	Gross income	Income = royalties and assignments	60%	Not defined	Additional reward can be paid also by assignee, howerer Uni guarantees the residul payment.
12.	3.0%	Combined	50.000 CZK for ntl patent + 100.000 CZK for EP/US / JP.	Patent grant	Not defined (implicitly 1 legal)	Not defined	Progressive	Net income	Direct costs. Income = Royalties and other income. Subsidies not income. Improvements not awarded.	40 % up to 100K, 50 % up to 500 K, 70% above 500K	Income-based called "reward from using".	Initial reward is raised by social and health insuarance, reward = net money.
13.	0.0%	Income-based	-	-	-	Not defined	Linear	Gross income	Not defined	25% (can by changed when reasonable)	Not defined	Not defined
14.	1.9%	N.A.	N.A.	N.A.	N.A.	N.A.	Degressive	Net income	N.A.	70 % up to 500K, 34% above 500 K	N.A.	N.A.
15.	2.8%	Combined	2-5 % of invention value	Rights exercise	4 legal	Not defined	Linear	Net income	Direct costs. Income - royalties, assignments, J/Vets.	50%	Income-based called "additional ".	Reward is sui generis, not viewed as salary reward, not included in average salary.

Source: Authorial analysis based on universities' data

3.2 Timing of the initial reward

The Patent law states that the reasonable reward shall be paid in case the employer exercises the right to the employee invention. However, the law is not clear about the timing. As can be understood from their prevailing reward schemes, universities consider reasonable to pay one initial amount in the first stage of the remuneration process. One third of the sample does not define clearly the moment. Most universities that guarantee this reward are clear about the timing of the reward, however, two groups of universities with different approaches can be identified among them: 1) Half of the sub-sample (50%, n = 12) applies this reward without delay, practically several months after exercising the right to invention. The rest of the sub-sample (2 universities) pays the initial reward after some protection is granted.

The timing of the first reward is interesting also in terms of determining whether the reward is paid for the invention regardless of the form of protection or whether the reward is somehow related to the protection granted. From the university data, it can be concluded that mostly the inventors are remunerated, no matter what legal protection the university later chooses. This practice can have a positive effect on employees' invention disclosures (Svacina, Antosova, 2017). Two universities pay in exchange for granted patents. Such a practice is understandable from the universities' point of view – registered patents are better (less risky) items for potential licensing (Brunsvold, O'Reilley, Kacedon 2012) or as a recognizable research result. Moreover, at this moment the employer could see much better potential benefits from the invention and estimate a reward more appropriately. On the other hand, the approach of rewarding only granted patents can be regarded as a restrictive interpretation, as the

Patent law lexically says that the employee inventor should be awarded if the employer exercises the rights, not if or after the protection is granted.

On the other hand, universities, which pay the initial reward only for granted patents, have (on average) substantially higher first reward this remuneration than those which pay remuneration irrespective of the patent granted (see university 12). Such a situation is logical, as it is generally possible to expect a higher benefit from granted patents.

3.3 Implementation of statutory factors in calculating the remuneration

As stated in the Patent law, the "reasonableness" of the remuneration should be tested by four factors, described in chapter 1.2. Almost 60% of the sample (n = 14) applies these factors somehow. Out of these, 6 institutions apply all four regulatory factors, one institution applies only technical and economic importance of the invention (1), leaving material share of employer and working tasks of employee out of evaluation process. Both universities who pay initial reward in exchange for granted patent (3 and 12), do not explicitly apply any of the regulatory criteria, however, they implicitly evaluate technical criterion, as patent represents a proof of world technical novelty. Therefore, the percentage of those who evaluate legal factors could raise implicitly up to 75% (from 7 to 9 universities). One university in the sample (8) applies regulatory factors differently from others. The factor of technical and economical importance is applied for the initial reward, other factors when assessing whether the initial reward is manifestly disproportionate to the real benefits from the invention and, thus, whether the additional remuneration should be paid or not.

3.4 Methods of calculating and amounts of initial rewards

Most universities indicate at least indicative amounts of the initial reward (83.3%, n = 12), others refer to the decision of the dean of the faculty. The level is from CZK 100 to CZK 48,000, depending on the legal criteria evaluated (Note: The range calculated by the authors). The average value of the initial reward can be assessed approximately at CZK 5,000-10,000. Exceptions are institutions 12 and 15. University 12 pays 50,000 CZK for granted national patents, and another 100,000 CZK for each US, EP and JP granted patent.

University 15 estimates an initial reward differently from the others. The reward is calculated as a percentage of the value of the invention at the time the employer exercises the right. However, it is not clear from the internal directive whether this is cost or market value estimate. The percentage is set somewhere between 2 and 5%, depending on the four statutory criteria being evaluated. Theoretically, this construction seems to be ideal, however, to estimate the value of an invention in such an early phase is a difficult practical task (Razgaitis, 1999). What is interesting on such a construct is, that unlike the others, university 15 implements an asset valuation methods (Reilly and Schweihs, 1999) when estimating the initial reward.

So, does the university 11, but in a different manner. As we mentioned in chapter 3.1, this university guarantees a specific (fixed) reward to the inventor for his active co-operation in the commercialization process. This remuneration is based on an agreement between the inventor and the university. In case of disagreement, the remuneration is calculated as a multiple of the average hourly wage and the number of

extra hours spent. This approach is, de facto, a cost approach to asset valuation (Reilly, 2012), however somewhat reduced, as the calculation is limited to the cost of labor.

3.5 Types of income-based systems

Universities differ in parameters of their income-based reward schemes, too. They use three systems: degressive, linear and progressive. In the degressive system (46.7%, n = 15), the inventor receives a higher proportion of the lower amounts and, with additional benefit's growth, his share decreases. In the linear system (46.7%), the inventor still receives the same proportion; the progressive system (6.7% = 1 university) offers increasing income shares for inventors. As for the income shared with inventors, Net income system prevails (73%). In this system, different cost items are first deducted from commercialization revenue, then the net income is divided between the inventor, the university, and the inventor's department. The system based on Gross income (20%) divides the income from commercialization directly. One system we have called "Mixed" can be considered as a Gross income system with elements of the Net income system (will be specified in the next chapter).

Income-based schemes are also interesting from the perspective of fulfilling the legal framework. The Patent Act refers to additional compensation if the reward paid does not match the real benefits received. 7 out of 14 universities refer to the income-based reward directly as "additional compensation". 2 universities call a revenue-based reward "reward for the use of the invention". 1 university uses both terms for this reward. Thus, generally, universities define implicitly the disproportion between "reasonable reward" and "income from the invention" as the difference between situations where the invention is and is not commercially exploited.

U.S. and U.K. universities in our sample use these systems mixedly as Czech universities, Dutch universities use only Net income linear systems, German universities have only Gross income linear schemes. The German system is most likely affected by the German Employees Invention Act (ArbEG), which provides for the calculation of reward based from gross revenues (Trimborn, 2009), and, since 2002 the Act applies on university inventions, as well (Czychowski, Langfinger 2010).

3.6 Share of income for inventors

As shown in Tab. 2 in the last row, the average income share for inventors across all systems oscillates around 50%, the interquartile range is 45-70% (range calculated from the sums up to the first milestone). U.S. universities have on average lower rewards (33.3-50.0%), U.K. universities are more generous (55.0-87.5%), German universities apply all the same 30% and Dutch universities all 33.3% equally.

Generally, extraordinary values are reached in degressive systems in the lowest income category. This income category is defined by varying amounts, from CZK 100,000 to CZK 2 million, with the most frequently occurring amount of CZK 1 million. In this respect, university 1 is completely unusual, as it offers the inventor the entire income from commercialization up to CZK 1 million. As the university states in its directive, they try to involve more academics in the technology transfer process by this arrangement (they currently have the highest, 26.4%, share on patenting activity – data from Eliáš (2012), but only 1.5% licensing productivity, col. 2 in Tab. 1).

If we compare Net and Gross income systems, we can see an average premium of around 10 percentage points in favor of Net income systems. This difference can be explained by the effect of the deducted costs in Net income systems.

Tab. 2: Average income shares for inventors – different perspectives

	1st milestone	2nd milestone	3rd milestone
Avg degressive (n=7)	72.9%	45.6%	39.9%
Avg linear (n=7)	45.7%	45.7%	45.7%
Avg progressive (n=1)	40.0%	50.0%	70.0%
Avg Net income (n=11)	61.4%	47.6%	46.7%
Avg Gross/Mixed income (n=4)	50.0%	40.0%	36.7%
Avg all (n=15)	**58.0%**	**45.9%**	**44.6%**

Source: Calculated from the universities' guidelines, n = 15.

3.7 Definition of income from invention

While the distinction between Gross and Net income is relatively clear, the universities are not very precise in defining the "income from the invention". The directives most frequently mention royalties (6 cases) and income from the sale of rights (4 cases). It is rare to mention dividends from ownership interests (2 cases), and the value of these ownership interests (1 case). From the negative definition perspective, it is most common not to include in the income various subsidies and other public support. University 2 defines the income as "from external commercialization", therefore 4 universities do not include subsidies. For example, university 6 includes into income the fair value of the ownership interests in spin-off companies, but does not include dividends from these spin-offs beyond the value of these ownership interests. This university is also a university whose system we refer to as "Mixed income" as it does not define the costs to be deducted from gross income, but at the same time it includes the fair value of the ownership, the value of which is essentially net income.

Tab. 3: Income components

Included	Not included
Royalties (6)	Subsidies (4)
Assignments (4)	Part of dividends (1)
Dividends (2)	Option fees (1)
Ownership interests (1)	
Services (1)	
Other income (3)	

Source: Compiled from the universities' guidelines, n = 14.

No university sets the maximum amount of income to be shared with the inventor. The only cap mentioned is in case 6 – the inventor gets no income share, if he gets at least 5% share on a spin-off company. From the Patent law perspective, the income-based systems allow universities to avoid situations where there would be a further disproportion between the amount already paid and the additional benefits of the invention. Similarly, foreign universities do not generally set a reward cap. From our sample, only 2 Dutch universities apply the maximum amount, namely EUR 1 million, EUR 2,5 million (Universiteit Leiden and University of Amsterdam)

Only three universities (4, 10, 12) solve the question of rewarding improvements to the original invention, moreover, differently. While universities 4 and 10 add benefits from improvements to the benefits of the original invention, University 12 does not count the benefits from improvements at all.

In terms of costs deducted from revenue, most universities with the Net (Mixed) income system (n = 12) work with various direct costs related to the commercialization process (9 cases). For example, fees for patent applications, patent maintenance fees, fees for consulting services, etc. are deducted. Relatively many universities (1, 2, 4, 6, 8) subtract different types of taxes. Two institutions subtract a certain part of overhead, two institutions the amount of the initial reward paid earlier.

3.8 Social/health security and taxes

A special issue that affects the amount of remuneration to be paid to inventors is deductions for social and health insurance and deduction of personal income tax ("statutory deductions"). In other words, if a remuneration such as 1 mil. CZK is paid, whether this remuneration will be reduced, like the salary of the inventor, by statutory deductions or not. In this matter, approaches are very different. 7 universities do not mention this at all, only a few universities are clearer in this matter. Universities 6 and 12 regard initial reward as a net amount, that is, without statutory deductions, on the other hand, university 6 applies all statutory payments from income-based remuneration, university 12 is silent on this part of the remuneration. Cases 3, 5 and 8 also refer to statutory deductions, but it is not always clear whether initial, income-based or both parts of the reward are meant.

Conclusions

Inventions have recently become a source of competitive advantage of organizations. Most inventions arise under employment contracts, and if the employer exercises the right on such an invention, Czech patent law orders the employer to pay the employee an appropriate remuneration. This commitment continues to be strengthened for institutions that carry out their research and development from public funds. In this article, we provided an evidence of how Czech innovative universities interpret the "reasonableness" of the remuneration.

Most analyzed institutions apply a two-stage compensation system - combination of a smaller initial reward reaching usually up to 50,000 CZK, followed by the share on the technology commercialization income, reaching on average 50 % of income. In addition to these two components, not negligible number of universities offer the inventor an option to buy back the invention after failing to commercialize it through university channels. This can be considered as a third component of the overall remuneration, however, probably not highly valuable in most cases.

A common practice is to pay an initial amount as soon as possible, however, few universities pay this reward after a patent is granted. This seems to be a controversial practice, as the law does not limit paying rewards on granted patents only. On the other hand, rewards for granted patents are much higher compared to "quick" rewards after invention disclosures.

We identified some universities offering just income-based rewards. Such a practice can be observed at foreign universities too. However, it is questionable whether pure income-based systems comply effectively with the Czech patent law. The doubts exist here due to the dramatically low rates of commercialized patents (at relevant universities and across the sample too) and, consequently no rewards for majority of disclosed inventions. Moreover, such a system can be non-motivating for invention disclosures.

One of the most challenging implicit legal requests of the Czech Patent law is to pay a reward that is proportionate to the benefits from the invention. In this respect, two-staged systems seem to be the best solution, as they keep the proportion by expressing the reward from commercialized patents (additional reward) as a percentage from earned benefits. The proportion of both categories is strengthened by the fact, that no university in the sample sets a cap on the reward.

Most universities apply also the statutory criteria in the rewarding process. However, it is mostly only when estimating the initial reward. As for the additional reward defined by the law, the universities mostly apply only income criterion. We identified also few patterns of asset valuation elements in estimating the initial rewards.

Czech universities use both Gross and Net income definitions (in this aspect they do not differ from foreign universities) and, across the sample, there is a lot of confusion in what Czech universities count and do not count on the revenues and costs of commercialization, and how the statutory levies are calculated for the rewards. An important finding is that there is a tendency not to include subsidies into the income from the invention.

Our efforts aimed at finding common and creative patterns in interpreting broad legal framework for remuneration of employee inventors at Czech universities. Follow-up research can further explore each university deeper, discuss and compare detailed experience with rewarding employee inventions, and work with other data using quantitative methods.

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List of foreign universities for comparison purposes

USA: Harvard University in Cambridge, Yale University in New Haven, Drexel University, San Diego State University, University of Connecticut, The Johns Hopkins University, University of Wisconsin-Madison, Northwestern University, Stanford University, University at Buffalo, Kansas State University, Arizona State University, University of Florida, Brown University in Rhode Island, Binghamton University, University of Oregon, Tufts University, Ohio University, University of Michigan Medical School, The University of Chicago, University of Louisville, University of Cincinnati, Princeton University, The University of Georgia, Ball State University, The University of Texas at Dallas (UT Dallas), Worcester Polytechnic Institute, University of Texas Health Science Center at Houston. **UK:** University of Leicester, University of Bristol, University of Oxford, The University of Kentucky, The University of Nottingham, University of York, University of Glasgow, University of Cambridge, Aston University Birmingham, The University of Manchester, University of Strathclyde in Glasgow, University of Plymouth, Southampton Solent University, Harper Adams University, University of Hertfordshire, The University of Surrey, University of Liverpool. **Germany:** Humboldt-Universität zu Berlin, Technische Universität München (TUM), Universität des Saarlandes, University of Bremen. **Netherlands:** University of Amsterdam (UvA), Eindhoven University of Technology (TU/e), Leiden University.

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