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Review of India's policy with respect to R&D tax incentives and  
Intellectual Property Rights**

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## **Innovation policy instruments at firm level**

### **Review of India's policy with respect to R&D tax incentives and Intellectual Property Rights**

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*Right through her independence, India has been trying to achieve economic growth with technological self-reliance. In order to achieve this goal, the country has been adopting a mix of industrial and innovation policies. During the period up to and including the early 1990s, the state attempted to give shape to this goal by intervening directly by generating a whole host of industrial technologies through state-owned undertakings and other public research institutes. During the period since the 1990s, coinciding with the economic liberalization policies the state has replaced this with incentivizing the innovation system of the country. This is because the state wants the private sector enterprises to be at the core of the innovation system. Key to incentivizing the private sector was two specific policies, namely the R&D tax policy and the policy on Intellectual Property Rights. The paper undertakes a critical review of the very recent changes to these two policy instruments.*

**Keywords:** Innovation, technology trade balance, R&D services, R&D tax, Intellectual Property Rights, patents, India

**Introduction:** Over the last few years the Government of India has been on a policy spree. A number of policy documents ranging from those relating to specific industries such as Automobiles, Biotechnology, Chemicals, Electronics, Electrical Equipment, Information Technology and Telecommunications to a more general policy on manufacturing and a science, technology and innovation policy, Intellectual Property Right etc. have been announced in a rather a feverish pitch. It is almost as if the underlying belief is that having some policy statements is better than no policy at all. Moreover these policy exercises have had the positive effect of

bringing in some strategic thinking with respect to very specific sectors. This sort of a strategic thinking is very much necessary for an important area like innovation, where in a situation of fast changing technologies and the catching up strategies successfully unfolded by a variety of countries especially in Asia, it is very essential for an emerging country like India to have a clearly articulated set of policy instruments and institutions to enable the country to achieve the kind of technological leadership that she is aspiring to have. This present exercise has been preceded by a number of statements and near policy documents on innovation such as the aborted attempt at passing a National Innovation Act, the rather long conversation in effecting an act which aimed at incentivizing publically funded research (Protection and Utilization of Public Funded Intellectual Property Bill, 2008).

The setback in the macroeconomic performance of the country for a two years or so beginning 2008-09 especially with the slowing down of GDP growth, policy analysts have been quick to blame a sort of 'policy paralysis' which seems to have gripped the country's economic decision-making process. However with a plethora of policy documents on every conceivable industry/sector or issue what is perhaps felt is that what we lack is not supply of policies but its lackadaisical implementation. On that count, the various sectoral level and macro policies may also suffer the same fate as the set of instruments and institutions that are listed in the policy document are stated in such general and vague terms that its actual implementation will be next to impossible or at best difficult to track over time. More importantly the policy documents are virtually silent on whether the policy implementation will be subject to any form of concurrent evaluation. In fact the lack of this important practice has virtually made the laudable objectives of earlier policies remaining even now just on paper.

As far as Science and Technology development is concerned since independence India have had four such policies, namely the Scientific Policy Resolution of 1958, the statement on Technology Policy in 1983, the New Science and Technology Policy of 2003 and the Science, Technology and Innovation Policy of 2013. One could see from the titles of these policies that the policy has proceeded from the promotion of science to science and technology to innovation. Further, there have been a number of specific policies dealing with specific institutions or instruments to promote innovations such as the policy on patents or providing tax incentives for increasing the quantity of R&D. Then there are policies, which are targeted at specific sectors such as for

instance on the automotive or the ICT sector. The former are referred to as horizontal and the latter as vertical policies.

In the context, purpose of the paper is to first undertake a quick survey of these horizontal and vertical policies. This is followed by an evaluation of two of the most direct policies for promoting innovations at the level of firms as firms are at the core of a country's National System of Innovation (NSI). The policies in question are the R&D tax policy that has been tried out by countries across the world as a way of encouraging firms to commit more resources to R&D and the second one is the policy on Intellectual Property Rights (IPRs). Over the years, India has elaborated on its R&D tax policy in such a manner that the country has the most generous R&D tax regime anywhere in the world. But has this led to significant increases in R&D investments by firms? The paper attempts to provide some explicit answers to this policy concern. Further, India's IPR policy, which has been made TRIPS compliant in 2005, has been criticized by western governments and industry, notably from the United States of America, as being not strong enough for MNCs to confidently establish their R&D activities in the country. This has led the central government to formulate a new policy on IPRs, which has been announced on the 12<sup>th</sup> of May 2016<sup>1</sup>.

Rest of the paper is organized as follows. In section 1, we undertake brief review of the major general horizontal policies in as much as it incentivized local technology development by business enterprises. Section 2 reviews the changes in the R&D tax policy as India has now one of the most generous R&D tax policies in the world. However very recent policy announcement has attempted to tone the policy down making it less generous. The reasonableness or otherwise of this policy shift is discussed in this section. Section 3 reviews the new IPR policy of the government. Section 4 concludes the paper.

**1. Survey of policies for promoting innovations at firm level:** Policies for increasing the generation and diffusion of innovations can broadly be categorized into two: horizontal and vertical. The former deals with general policies, which lay the framework conditions for innovations to occur as the aim of these policies, are to increase the supply of innovations in the

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<sup>1</sup> The new policy could be found here:

[http://dipp.nic.in/English/Schemes/Intellectual\\_Property\\_Rights/National\\_IPR\\_Policy\\_12.05.2016.pdf](http://dipp.nic.in/English/Schemes/Intellectual_Property_Rights/National_IPR_Policy_12.05.2016.pdf)

(Accessed on July 14, 2016)

overall economy. The horizontal policies can further be subdivided into two categories: (i) those dealing with improving the overall framework conditions for innovations to occur. Examples of this would be the overall Science and Technology and Innovation Policies; and (ii) specific instruments that are designed to increase the supply of innovations. Examples of this would be the patents policy, R&D tax policy, the policy on public technology procurement, direct support for R&D in the form of research grants or the policy on venture capital funding. The country, over a long period of time has actually relied on horizontal general policies, as these are framework policies designed to hasten technological self-reliance in the country. There were four such policies starting from 1958 until 2013. See Table 1.

(Table 1 about here)

The initial policy was targeted at the production of science and not so much applied R&D. This can be argued as logical as the country requires scientists of certain caliber to indulge applied and development research.

There are two common issues that all the four policies have emphasized. The first one is the importance of domestic technological development through investments in R&D. The more recent policies have of course set specific targets to be met in terms of GERD to GDP ratio. The second one is the emphasis on improving the quality and quantity of scientific manpower for R&D. In fact the more recent policies have articulated this more clearly. However on both these issues, the actual achievements so far has fallen considerably short of what was expected. For instance, the GERD to GDP ratio has never crossed even one and density of scientists and engineers continues to be low. Further, while the country has actually demonstrated its technological capability in industries such as the pharmaceutical, automotive and ICT industries, its overall technology trade balance (TBP1) has been negative and increasing over time. However when the technology trade balance is adjusted for receipts and payments in R&D services (TBP2) the intensity of the negative trade balance is reduced. See Figure 1. This means that at a very macro level the policies have failed to achieve their desired targets of India achieving overall technological self-reliance. .

(Figure 1 about here)

On the second issue of increasing the number and quality of scientists and engineers, the actual situation is no better. The total stock of R&D personnel has shown considerable increase from just 0.94 lakhs as on March 1996 to 4.41 lakhs as on March 2010. However this total hides the density of scientists engaged in R&D. On a density basis, the number of researchers per million people is one of the lowest in the world as India has just 164, while China has 863, Brazil has 668 and developed countries such as Japan has 5139 and Korea has 4963. With such a low density of R&D personnel, it is doubtful whether the country could that easily be transformed to a knowledge-based economy in the near future. Further, 56 per cent of the total R&D personnel are composed of auxiliary and administrative personnel and only about 44 per cent is engaged in pure and simple R&D activities. In short, on both counts of increasing technological self-reliance and in increasing the density of scientists and engineers, the successive policies appears not to have borne any fruits.

Further, in addition to the explicit S&T policies, the National Manufacturing Policy of 2011 (NMP) also had spelt out a number of pronouncements for increasing investments in innovative activities by manufacturing enterprises<sup>2</sup>. The NMP also has pronouncements on issues such as technology acquisition and development, training and skill upgradation measures and in dealing with manufacturing firms in the Small and Medium (SME) sector, public procurement and on trade policies in as much it affects the manufacturing sector. Bout on all these counts the policy does not state any schemes or measures that was not available earlier excepting that it has brought together separate issues under one umbrella head.

Apart from these general framework policies off late (especially over the last ten years or so), the government has for the first time has been having policies targeted at specific industries. We could identify policies with respect to Automotive, Biotechnology, Chemicals, Electronics, Electrical equipment, IT services, Pharmaceutical, and Telecommunications. In other words, what one finds is a plethora of policies and not any lack of it. The aims of all these sectoral policies have been redefine the sectoral systems of innovation of these policies in such a way that it contributes to these industries becoming more innovative. By announcing these sectoral policies, the

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<sup>2</sup> For a critical review of this policy, see Mani (2011b)

government has affirmed the oft-repeated concern of ‘one size fitting all’, which is implied in the framework policies.

Given the fact that the Science, Technology and Innovation Policy of 2013 is the most recent framework policy for promoting innovations, we undertake a detailed review of it. This attempted in the next section.

## **2. The R&D tax policy**

Intramural R&D is one of the main routes through which firms innovate. In the literature on the economics of innovation, there is a well-known result that if industrial R&D is left entirely to the hands of private sector enterprises, then there is a likelihood of these enterprises underinvesting in R&D which means that the actual amount of R&D undertaken will be less than their socially optimum level. The desire to underinvest is caused by the problem of appropriability or the failure of private sector agents to fully appropriate the full returns of their own research. Governments across the world have sought to overcome this problem of underinvestment by providing some sort of subsidies to private sector firms to encourage them to make continued investments in R&D. India too has been using tax incentives to encourage domestic enterprises to commit more resources to R&D. This policy on R&D tax incentives has evolved over time.

### **Recent changes in R&D tax policy**

Since 2009-10, the union government provides a weighted tax deduction of 200 per cent for any capital and revenue expenditure incurred on in-house R&D by a company. In that year India joined a growing number of countries in offering what is referred to as “super deductions<sup>3</sup>” for encouraging additional investments in R&D by firms. In fact Mani (2014) had shown that India had the distinction of having the most generous tax regime for R&D investments. This was not to last long as the Union budget for 2016-17 reduced the tax incentives for performing R&D in business enterprises from the current 200 per cent to 150 per cent from 2017-18 onwards and up to and including 2019-20. From 2020-21 onwards, the tax incentive will be further reduced to just 100 per cent of R&D.

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When the R&D tax incentive exceeds 100 per cent of R&D expenditure, it is referred to as super deductions. There are, at present 16 countries which provide super deduction for R&D.

Simultaneously the finance minister has also announced a patent box type of incentive for the first time wherein income received in the form of royalties and technology license fees received by Indian companies are taxed at a reduced rate of 10 per cent from the fiscal year 2016-17 onwards. The introduction of patent box which encourages output of R&D while the reduction of R&D tax incentives reduces the incentives for input to innovation. While an advance announcement of an R&D tax policy is credit worthy as it makes the policy a stable one, is the government justified in becoming less generous towards R&D investments by firms in that process. The only negative reaction to this reduction, hitherto, has come on from the pharmaceutical and life sciences industry, which together account for over a quarter of the total Business Enterprise R&D expenditure in the country<sup>4</sup>. The proposed streamlined reduction came as a rude shock as part of its pre-budget lobbying the industry was clamoring for an even more generous incentive: an increase in weighted tax deduction on R&D from 200% to 250% and expand the scope of the benefit to include R&D expenses incurred outside the facility like bio-equivalence studies, clinical studies, patent filings and product registrations. So for the industry was a double blow. The cliché evidence-based policy making has been doing the rounds in government's policy making circles recently, but is this policy of a graduated reduction based on any empirical analysis? There is course no denying of the fact that evidence does matter to sound policy making. In order to understand the reductions in R&D tax incentive proposed in the latest union budget, we first survey the main arguments for subsidizing R&D through tax incentives as a very large number of both developed and developing countries have this (Deloitte, 2014, Rashkin, 2007) type of a subsidy built into their corporate income tax code. This is followed by a discussion of R&D tax incentives in India as it evolved time, the amount of tax foregone, the number of firms taking advantage of this scheme etc. Finally we discuss whether the very generous scheme in India has really encouraged firms to commit additional resources to R&D.

### **Theoretical justification for subsidizing R&D through the tax route**

In order to proceed with our analysis, it is necessary to state the reasons as to why R&D

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<sup>4</sup> See Pilla (2016)

by especially private sector enterprises should be incentivized, in the first place by providing subsidies when across the world and especially in India the current thinking is for paring down subsidies and replacing that with reduced rates of corporate taxes is a better strategy in terms of public policy rather than providing outright subsidies. However R&D is one of those economic activities where an outright subsidy linked to corporate taxes is justifiable. In house or intramural R&D is one of the main routes through which firms innovate. In the literature on the economics of innovation, it is widely recognized that if industrial R&D is left entirely to the hands of private sector enterprises, then there is a likelihood of these enterprises underinvesting in R&D, which means the amount of R&D undertaken will be less than the socially desirable optimum. The tendency to underinvest is caused by the problem of appropriability or the failure of private sector agents to fully appropriate the returns of their own research. Governments across the world have sought to overcome this problem by providing subsidies to private sector firms to encourage them to make continued investments in R&D. Most countries in the world including the United States does subsidize intramural R&D to a certain extent. The subsidy can manifest itself in the form of a direct support through provision of research grants or indirectly through R&D tax subsidies. Of the two forms of support, indirect support is preferred as it interferes less with the market mechanism and hence termed as a market-friendly instrument. In many developed countries such as Australia, Canada, France, the Netherlands, Japan and Korea, R&D tax incentives account for over 55 per cent of total government support for R&D. There is a long standing debate on whether direct subsidies generate more R&D than tax incentives, or vice versa and it is not a settled debate. Governments should in principle be able to target these projects with the highest marginal social rates of return via direct subsidies. With tax incentives this is more difficult, since the general nature of tax incentives allows firms to expand their R&D activity in areas with high private rates of return (in the short-run). On the other hand, firms might lobby successfully for subsidies that are in their interest, possibly diverting subsidies in ways not conducive to innovation - an argument made by Hall and Van Reenen (2000).

### **Evolution of R&D tax incentive in India**

India has been evolving its tax regime with respect to R&D over time. See Table 2. There are four important features of this scheme that have to be emphasized. The first one is that there are no restrictions on the use of the Intellectual Property Right (IPR) arising

from the tax treated R&D to be used within India. The second one is that both domestic and foreign companies, which satisfy the other conditions, are eligible to seek the subsidy. But the R&D must be conducted within India. The third one is that if the firm is in a loss situation, unused benefits may be carried forward for the next eight years, but it cannot be carried back to earlier years. The fourth one is that qualifying expenditures include wages, supplies, utilities and other expenses directly related to R&D and the deduction of R&D expenditures shall be net of the grants, gifts, donations etc.

(Table 2 about here)

The R&D tax subsidy manifests itself in terms of the amount of tax foregone, which the Ministry of Finance has been estimating on a regular basis<sup>5</sup>. Over the years, the amount of tax foregone as a result of this subsidy scheme has grown at an annual rate of 17 per cent per annum and now accounts for about 8 per cent of all corporate subsidies (See Figure 2).

(Figure 2 about here)

Over the years the tax regime has become one of the most generous ones in the world (Mani, 2014). Generosity of a tax regime with respect to R&D is measured using a summary measure called the B-Index<sup>6</sup>. The lower the B-Index higher is the generosity of

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<sup>5</sup> Income tax deduction under *section 35 of income tax act* has specifically been provided for assesses who are engaged in R&D related to the businesses. Such involvement in scientific research may either be indirect or direct. The indirect involvement in scientific research involves making contribution by the business houses to the research programmes of the universities or institutions involved in research while direct involvement means incurring expenditure on the R&D themselves. The estimates of tax foregone by the Ministry of Finance encompass both indirect and direct deductions although we are in the present study more concerned with the direct deductions. However we assume, quantitatively speaking, the share of direct deductions in total tax foregone is more and also the trend in tax foregone reflects more the trend in trend in direct deductions.

<sup>6</sup> The B-is computed by the following formula:  $B\text{-Index} = (1 - \text{After Tax Cost}) / (1 - \text{Corporate Income Tax Rate})$ . 1- B-Index measures the tax subsidy rate. Higher the tax subsidy rate, higher is the generosity of the tax regime.

the tax regime. In fact, recent estimates of the summary measure-B-Index- confirms this view.

But has this generous R&D tax regime produced any desirable outcomes? A tentative answer to this important policy question requires a comparison of the responsiveness of in-house R&D by private sector firms to a unit reduction in the cost of performing R&D. Pending a more sophisticated analysis of the elasticity of R&D expenditure, we settle down with a an empirical analysis in which we compare the rate of growth of R&D with the growth rate of the R&D tax subsidy. The R&D tax subsidy manifests itself in terms of the amount of tax foregone, which the Ministry of Finance has been estimating on a regular basis.

#### **How effective have been the existing R&D tax subsidy scheme?**

A vast majority of studies assessing the impact of R&D tax incentives provided across the world concludes that R&D tax incentives spur investments in R&D. The estimates of the size of this effect are widely diverging and not always comparable across methodologies. The wide range of results probably reflects differences in methodology as well as differences between countries and policies, but is difficult to disentangle those effects. Studies that are more rigorous econometrically and yield more precise estimates find that one euro of foregone tax revenue on R&D tax credits raises expenditure on R&D by less than one euro (Lokshin and Mohnen, 2012; Mulkay and Mairesse, 2013 ). Studies on effectiveness must answer two questions. The first question that most of the existing studies have attempted to answer is the impact of R&D tax incentives on R&D expenditure. While this is useful and informative, policy makers require an answer to a second question to whether R&D tax credits make firms more innovative and productive. The latter aspect has been less studied and those, which have dealt with this, has used exogenous variation to verify the causality of this relation.

As far as India is concerned the only study that has attempted to measure the effectiveness of R&D tax incentives is by Mani (2010). This study, of course covered only the phase before 2010, when the tax incentive was less generous and also was targeted to specific industries. According to the study, while the instruments have been targeted well at the right sort of industries its effect in spurring additional investments in R&D is open to question.

In order to answer the two questions that we have raised, requires us to have a detailed dataset of firms which have actually been the recipients of R&D tax incentives, and their R&D expenditure, productivity and innovation outputs before and after the receipt of the incentives.

**Coverage of the scheme:** The number of number of business enterprises having recognized in-house R&D centres by the Department of Scientific and Industrial Research ( DSIR), which is an important prerequisite for being eligible to receiving tax subsidies, stands at 1762 by the end of 2014 (DSIR, 2015). Recognition by the DSIR is a necessary condition for the firms to receive the subsidy and this recognition is given for only a three year period and will have to be further extended on a continuous basis once every three years. During the period 2008 through 2014, about 894 firms seems to have availed of this scheme. This means that about 1 out of every 2 firms recognized by the DSIR have actually availed of the scheme. We refer to these firms as the DSIR list firms.

**R&D expenditure of the DSIR list firms:** There is no official monitoring of this scheme by any agency of the government and apparently not even by the (DSIR) which is charged with responsibility of administering the scheme. The DSIR'S latest published annual report for 2014-15 reported the total R&D expenditure of Rs 25000 crores for the 1762 recognized enterprises thus working out on an average of just RS 14 crores per enterprise. Implicit in this computation is the conjecture that the scheme is more taken advantage of by small and medium enterprises. Further, we compared the R&D expenditure of the DSIR list firms with all private sector firms reporting R&D expenditure in the *Prowess database*. See Figure 3. The R&D expenditure of firms in the DSIR list (i.e., for the 894 firms) on an average, account for only 7.5 per cent of all firms reporting R&D expenditures. But both have grown, almost entirely, at the same rate of about 18 per cent per annum. In fact compared to tax foregone (presented in Figure 2), the R&D expenditure of the DSIR list firms have grown at a rate which is slightly higher (1 percentage point higher).

(Figure 3 about here)

Based on this analysis, all that one can say is that only a limited number of especially small and medium firms have actually been taking advantage of this fiscal generosity of the state and even for these firms the rate of growth of R&D expenditure has only kept

pace with the growth of tax foregone which implies that these tax treated firms would have done that much investments in R&D, even if they did not receive the tax subsidy. In other words the subsidy scheme seems to have subsidized R&D which any would have been done by the firms without a subsidy. If this line of reasoning is correct, graduated reductions in the R&D subsidy scheme will not reduce R&D investments by firms but at the same time will reduce the corporate income tax foregone by the state. As such the reductions in the subsidy as envisaged in the budget is to be welcomed. We however highlight the provisional nature of the conclusions reached. As noted before, introduction of the patent box is a welcome addition as it serves to incentivize R&D to generate commercialisable outputs.

### **3. The New IPR Policy**

A new IPR policy, designed by the central government appointed a think tank on IPRs, which has been announced on May 12, 2016. In all fairness, although this policy pronouncement had gone through a democratic process of a green paper- white paper mode, is totally unnecessary as India has fairly clearly articulated laws on all types of IPRs (patents, trademarks, copyright, designs, geographical indication, Protection of Plant Varieties and Farmers' Rights Act, Semiconductor Integrated Circuits Layout-Design and Biological Diversity Act.). There are also a variety of institutions for administering and implementing the various provisions of these legislations. In fact, many commentators are of the view that India's TRIPS compliant patent regime which has almost all the TRIPS flexibilities built into it is quite adequate for balancing the interests of both inventors of new technologies and its users. The only disenchantment of India's IPR regime has been the pharmaceutical MNCs and the government of the United States of America. Private sector organisations in the U.S such as the U.S. Chamber of Commerce's Global Intellectual Property Center (GIPC). Although there has been much hue and cry that public policy making should be evidence-based the new IPR policy falls short of the standards that is expected of a real evidence-based policy which conducts empirical studies on issues underlying the policy and then design policy instruments based on the empirical and theoretical evidences available.

#### **The Context**

The GIPC considers India to have a weak IPR regime. In fact, in its IP index, India's IPR score is only 7.05 out of 30, while it is 10.41 for Brazil, 12.64 for China, 13.06 for Russia

and 28.61 in the case of USA. Therefore the US industry and trade, considers even the TRIPS compliant patent regime of India to be a very weak one and has been threatening strong trade sanctions against India through its government. The newly announced policy has been very cautiously received by the GIPC<sup>7</sup> when it states thus:

“We hope today’s announcement is a precursor to the concrete, structural changes that are necessary if India is to implement a strong IP-led innovation model. We welcome the government’s understanding that India’s innovative economy requires effective IP protection and hope this commitment will lead to decisive legal reforms. India must provide enhanced certainty for the rights of innovators in line with international best practice. We will be carefully reviewing this policy to determine whether this document creates the foundation for such steps. Regardless, IP will continue to be a central issue for any discussions between India and the international business community.”

We had argued earlier (Mani, 2014) that any composite index of the strength of a nation’s IPR regime is only of academic interest and is not factored into crucial technology decisions such as doing R&D in India. For instance, India has now become the major source of R&D service imports to the US economy (National Science Board, 2016) and US MNCs are unlikely to resort to FDI in R&D if they think that the country has an extremely weak IPR regime. Successive Services Provider Surveys conducted by the Offshoring Research Network has considered India as the most favourite location for R&D processes, engineering services and indeed for product designing. Further, the number of patents granted to foreign residents has always far exceeded the ones that have been issued to Indian inventors by the Indian patent office and among the major patent offices across the world, the Indian Patent Office has the least home country bias. The fact that in the recent past patents have been rejected by Indian courts and a compulsory license has been issued- all well within legal terms have been blown out of proportion by those against the India’s patent regime. The forthcoming Trans Pacific Partnership (TPP) which effectively is going to be far more powerful than the multilateral, WTO, also insists on a strong IPR regime which is normally referred to in discussions as TRIPS plus. It is against this continued international pressure in further strengthening India’s IPR regime that one has to analyse the present policy pronouncement.

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<sup>7</sup>See the announcement on the website of GIPC at: <http://www.theglobalipcenter.com/u-s-chamber-on-release-of-indias-intellectual-property-policy/> (Accessed on May 23, 2016)

## **The Policy**

The new IPR policy is quite distinct in its shape and content than other policy pronouncements of the government such as the new Science, Technology, and Innovation Policy, 2013 for instance. The IPR policy documents reads more like a committee report as the main component of the policy document is contained in seven objectives which are akin to recommendations in a commission of inquiry excepting that the present one has identified not only the specific steps that needs to be taken for implementing the objective, but also the ministry or the nodal agency that is responsible for implanting the objective. This is a refreshingly new aspect of public policy making where the policy document itself has given some specific directives for its implementation. Therefore, monitoring of the present policy and its evaluation, concurrently, is likely to be easier. However, the seven objectives themselves are not new and most of them have been expressed by earlier policy, pronouncements or actions. In the following, we undertake a rather detailed critique of these essentially with a view to find out if these are substantive.

The seven objectives can broadly be divided into three categories, those dealing with popularization and strengthening the administrative machinery for dealing with IPR issues (objectives 1, 4 and 7), those dealing with the generation and commercialization of IPRs (objectives 2 and 5) and those dealing with legal aspects, enforcement and adjudication (objectives 3 and 6). Of the three, I consider the third group the more substantive. In the following, we discuss each of these three groups of objective in some detail.

### **Legal aspects, enforcement and adjudication**

The policy document is a bit ambivalent here. It states at the outset that India's IPR laws are TRIPS compliant and the legal systems governing IPRs is firmly committed to the Doha Declaration on TRIPS Agreement and Public Health. Then it goes on to argue that existing IP laws may be reviewed where necessary, to update and improve them or to remove anomalies and inconsistencies, if any, in consultation with stakeholders. It does not of course state in clear terms what it considers an anomaly or inconsistency. Does it mean that section 3(d) and 3 (k) are anomalies and inconsistencies as has been demanded by organisations such as GIPC and the US government?

The present Patents Act, 1970 came into force in the year 1972, amending and incorporating the existing laws relating to Patents and Designs Act 1911 in India. The Patent (amendment) Act 2005 came into force from 1st January 2005, which made India's Patent Act of 1970 compliant with the stringent provisions of TRIPS. It brought changes in the previous patent system of India wherein product patent was extended to all subjects of technology including food, drugs, agro chemicals and micro-organisms. Moreover, Section 3(d) introduced into the said amendment act 2005 and introduces pharmaceutical product patents in India for the first time. The Patent (amendment) Act 2005 defines what invention is and makes it clear that any existing knowledge or thing cannot be patented. The provision defines that a 'novelty' standard - which, along with 'non-obviousness' or 'inventive step' and industrial applicability, are the three prerequisites for 'patentability'. "Discovery" essentially refers to finding out something which already existed in nature but was unknown or unrecognized. Therefore, discoveries are excluded from patent protection under section 3 of the Indian Patent Act 1970. In very specific terms, section 3(d) has raised the bar on the inventive or non-obviousness criteria, when it states that "the mere discovery of a new form of a known substance which does not result in the enhancement of the known efficacy of that substance or the mere discovery of any new property or new use for a known substance or of the mere use of a known process, machine or apparatus unless such known process results in a new product or employs at least one new reactant, is not patentable". The recent Supreme Court verdict against Novartis's patent for the drug Glivec is an instance where the judicial system has invoked this rule to deny a patent for a so called invention which did not pass this higher bar on inventiveness. GIPC and the US government has been very actively pursuing with the Indian government, relentless and even using the bogey of trade sanctions under 301, for a review of this contentious section 3(d). Another sub section of the Act that has been a bone of contention has been the section 3(k) which deals with an unconditional exclusion of mathematical and business methods, computer programs per se, and algorithms from patentable subject matter. There are strong welfare arguments against patenting of software per se as most inventions in computer software are of an incremental in nature and patenting of an earlier step will erect strong legal barriers to inventions in later steps. Government has been vacillating on software patents for quite some time now. Also evidence from the United States where software patenting is allowed shows that it exacerbates patent litigation. For instance, according to Bessen and Meurer (2009), 38 per cent of all patent litigation in the USA is with reference to computer related inventions. In India, an earlier attempt that was made in 2004 to have software patents was thwarted by intense debates against it both within and outside the parliament. Although, recently

in August 2015, the government sought to reintroduce software patenting in an ambiguous manner,<sup>8</sup> owing to strong opposition to it from civil society organizations, by February 2016 it was repealed. Now it remains to be seen where these two subsections, Section 3(d) and 3(k) may be reviewed or removed altogether as the new policy has such a provision.

However, the policy has been rather cautious on certain issues like the protection of trade secrets for which no legislation exists in India at the moment<sup>9</sup>. At present in India parties must rely on written down contracts to protect trade secrets which increases the transaction costs of especially R&D outsourcing deals between MNCs and Indian IT services companies. In 2008, the Department of Science and Technology, published a draft legislation titled the National Innovation Act of 2008 that would in part “codify and consolidate the law of confidentiality in aid of protecting Confidential Information, trade secrets and innovation”. However, this piece of legislation has never been taken to its logical conclusion. But what are the implications of having a legal provision for protecting trade secrets. On the positive side it can increase the scale and nature of R&D outsourcing to India for which India has built considerable amount of reputation for. On the negative side it can reduce or completely nullify any kind of technology spillovers from MNCs to domestic companies as the main conduit of technology spillovers is through labour turnover or movement of personnel and if trade secrets are protected this will reduce any form of positive spillovers to domestic firms.

The policy also discusses tradeoff between patent policy and competition policy and proposes research studies for properly understanding this tradeoff before legislating on this topic. It is unusual for a policy document to propose future studies, as the policy should itself be evidenced based. In other words, the think tank, which crafted this policy

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<sup>8</sup> In the August 2015 version, the guidelines allowed the patenting of software which demonstrated technical advancement, and did not clarify what this meant, sparking concern from start-ups and software product lobbies. Subsequently in December 2015, amid concerns raised by these stakeholders, it stayed the guidelines.

<sup>9</sup> Currently there is no specific or separate legislation that regulates the protection of trade secrets and confidential information in India. However, the courts in India have relied on equitable and common law remedies as a means of protecting trade secrets. Specifically, Indian courts have relied on the principles laid out in the Salman Engineering case.

statement, ought to have conducted such research studies and then made an appropriate policy pronouncement. This gives the reader the strong feeling that policy gives an impression of being very comprehensive but in the false sense of the term.

Technology transfer in general and especially in the context of clean energy and environmental technologies is another area that is touched upon and rightly so in the present policy. This is because the proponents of the TRIPS compliance had argued that a stricter patent regime envisioned under TRIPS compliance will precipitate large scale technology transfer to India. However, whatever fragmentary evidence that is available from successive RBI surveys on foreign collaboration in Indian industry shows that the number of technology collaboration agreements contracted between MNCs and unaffiliated Indian companies have gone down by a significant amount. The fact that the issue of technology transfer has been placed on the table should generate a greater effort on the part of the government to pursue this matter so that domestic Indian companies are able to secure technology licensing under better terms and conditions and also for the diffusion energy saving and environmentally sound technologies that can hasten the country's efforts in tacking greenhouse gas emissions and other climate change issues.

An aspect of legislation that has been completely avoided by the present policy document is the silence on incorporating utility models in India's IPR legislation. Utility models or petit patents are right sort of IPR mechanism for incremental innovations done by especially SMEs. Although many countries including China and South Korea has used this as a way of promoting innovations by SMEs. Of course the downside is for SMEs to use utility models as a way of thwarting competition. At least the policy document should have precipitated research studies so that an evidence-based policy making could have been attempted. Instead, it has chosen to be totally silent on this issue.

### **Generation and commercialization of IPRs**

The policy has laid great emphasis on the generation and commercialization of especially patents. This is because a lion's share of the patents granted by the Indian Patent Office in and by Indian inventors in foreign jurisdictions such as the USPTO or the EPO has gone to MNCs either based abroad or in India as the case may be. However, most of the measures that are proposed for generation of IPRs is for popularizing the notion of patents among a wide constituency through essentially a large number of superficial means like "running a train with a theme that will crisscross the nation". State level patent cells have

already tried out such means and the Patent Facilitating Centre attached to the Technology Information and Forecasting Assessment Council (TIFAC) has also been engaged in various types of activities like training, developing course materials etc to popularize IPR issues among scientists and researchers. In fact, more credible policies for generating patents through the promotion of R&D through essentially generous tax incentives (Mani and Nabar, 2016) has also been tried but not with much success. The fact that India has one of the most generous R&D tax regime has completely escaped the attention of the think tank that has designed the IPR policy. Further evidence that the policy is not evidence-based. Innovative activities in India are concentrated in a few firms in a select number of industries such as pharmaceuticals, computer software, automotive and in electrical and electronic industries. If one goes by the Schumpeterian hypothesis firms have to be large to invest in R&D and then generating innovations so that they have enough internal resources to invest in R&D that can yield patents. Further, one of the major constraints for patent creation by firms in India is the fact that they do very little R&D and that is in turn due to the fact that the country has very few scientists and engineers engaged in R&D: according to recent (2010) estimates of Department of Science and Technology India had only 0.44 million scientists and engineers in R&D which works out on a density basis to just 9 scientists and engineers per 10,000 labour force. Low outturn of scientists and engineers, increased high skill migration and also a hugely varying quality of those that are available are some of the systemic factors that result in a small number of patents by resident inventors. Without correcting for these, one cannot increase the number of patents through numerous superficial means suggested in the policy document. A further issue is the quality of these patents. Forcing inventors, through artificial means, result in low quality frivolous patents and as a proof of this one does not have to look any farther than the experience of CSIR with respect to patenting. CSIR has been very active in patenting owing largely to the Vision 2020 strategy implemented by its legendary director general. Although a large number of patents have been granted to CSIR both within and outside India, its commercialization record has been very poor. Worldwide most of the patents are exploited by patent generators themselves. Valuations of patents are also a very tricky issue and are best left to the market forces to find its real price or value. Establishment of patent exchange etc. makes sense only for those countries, which produce high quality commercialisable patents. Such recommendations are valid only when the county has gone up the technology ladder. In sum, this part of the policy document is very low on evidence on generation and commercialization of patents either from India or from abroad. Also the policy does not consider the strategy of patenting by modern corporations as a way of entry deterrence

and litigation. Large-scale generation of frivolous patents may result an increasing number of patent litigation which is welfare reducing. Jaffe and Lerner (2007) have demonstrated this aspect of increasing patent litigation in the case of the United States. Small but growing number of patent litigation over frivolous patents in India has also been overlooked.

The policy also seeks to restart the now defunct conversation on encouraging publically funded R&D by incentivizing it on the model of the aborted Protection and Utilization of Public Funded Intellectual Property Bill, 2008. The bill stressed the creation of IPRs as a form of accountability- inspired by the American Bayh-Dole Act of 1980. Most of the commentaries on that proposed bill including the Parliamentary Standing Committee were of the view that the bill was likely to take away the creativity from universities and research institutions and instead promote crass competition between scientists. Careful studies done in the USA context too have not found the Bayh-Dole Act to be very beneficial in making the US universities generating more patents.

The government is already committed to incentivizing the commercialization of patents when in the union budget for 2016-17, the Finance Minister has announced a patent box type of incentive for the first time wherein income received in the form of royalties and technology license fees received by Indian companies are taxed at a reduced rate of 10 per cent from the fiscal year 2016-17 onwards. The introduction of patent box encourages output of R&D. The policy document, however, makes no reference to this policy initiative, which has already been implemented.

The section on commercialization of IPRs goes on to recommending the encouragement of the domestic production of Active Pharmaceutical Ingredients (APIs), revitalizing public sector undertakings on R&D on Neglected Tropical Diseases. All these are very worthy and laudable objectives, but not at all clear as being part of a policy on IPRs. These should sit well in a pharmaceutical policy.

### **Strengthening the institutional machinery for administering IPR issues**

This is perhaps the most positive aspect of the policy document. Past commentators had pointed out three problems with the way IPRs are administered in the country.

The first one deals with the administration of the various IPR legislations being handled

by a disparate number of organisations. For instance, Patents, Trade Marks, Designs and Geographical Indications were handled by the Controller General of Patent..., the copyrights by Department of Higher Education, the Semiconductor Circuits Layout-Designs by the Department of Electronics and Information Technology. The New policy has now recommended just two organisations, the controller general of patents to be still responsible for patents, trademarks, designs, geographical indications etc., while the administration of the latter three are to be brought under the aegis of Department of Industrial Policy and Promotion (DIPP) which will become de facto the nodal agency for administering IPRs in the country as the Indian Patent Office too is a subordinate office under the DIPP. In fact the re-designation of the comptroller general of patents, designs, trademarks and geographical indication as controller general of IPRs is not just a reform in form but in content as well.

The second one deals with the functioning of the Indian patent office itself, which is staffed by a small number of patent examiners. Two main problems, with respect to this important office, are often raised. The first one is the very high pendency rate owing to the small number of examiners the patent office has. According to an estimate 2.46 lakh patent applications and 5.32-lakh trademark registrations were pending (as on November 1, 2015) due to shortage of manpower. The second one is, again owing to the small number of patent examiners, the quality of patent examination itself was suffering leading to both Types 1 and 2 errors in patent grants. The proposed reform which includes both recruitment of more number of patent examiners and modernization of the patent office and the training of patent examiners in best practices in patent examination from some of the best jurisdictions is likely to lead to considerable improvement in the quality of examination and grant of all types of IPRs and especially patents.

The third one deals with timely publication of detailed data, (organisation and technology-wise, on IPR applications, grants, and the detailed data on pre and post grant opposition to patents (which is unique to India) and also the detailed data working patents. However the new IPR policy has nothing much to say on this important aspect that would have given a real fillip to evidence-based policy making in the area of innovation. .

#### **4. Summing Up**

The paper dealt with two major policies, the R&D tax incentive and the IPR policy both of which aims at incentivizing firm level innovative activity in the country. Both the policies have been evolving over time and we have subjected the current versions of both

to a critical scrutiny.

The promotion of innovation primarily through R&D tax incentives must consider the following two issues. First, the government want business enterprises to spend more on R&D as R&D investments by private sector enterprises is an important conduit for reaching government's target for its overall research intensity as stated in its successive innovation policy statements since 2003. But even if, through tax subsidies and other inducements, the amount of investment in R&D is stepped up, it will not necessarily lead to more innovation. What matters is how well companies manage the innovation process, how they organize and motivate their scientists, how they decide which ideas to pursue and which to discard. Second, innovation surveys done across the developing and developed countries including that of India had shown that in-house R&D by firms form not more than a third of the innovation expenditures incurred by a typical firm. There are a whole host of non R&D routes like purchase of latest vintage of capital goods, training of technicians etc. that leads to innovations in firms in addition to intra mural R&D. So defining innovation policy almost exclusively in terms of R&D policy may not actually be a prudent and holistic one. The reductions in R&D subsidies must be combined with a rethinking on the content of innovation policy instruments that facilitate financing of innovations in general. Finally, any effective monitoring and evaluation of such a generous scheme out to be based on good quality empirical evidence rather than merely stating over and over again that policy formulation and its implementation must be evidenced-based. In the context the Department of Scientific and Industrial Research (DSIR) must be encouraged to publish a list of enterprises which have actually availed of the scheme every year, the amount of subsidy claimed (or the tax foregone) and the quantity of R&D expenditure carried out, and some indicators of the quantity of output of such innovative activity. Without such an evidence, policy making in India will remained shrouded in the politics of lobbying and other weighty non-technical considerations

Regarding IPR policy, the general consensus in the country is that India has a TRIPS compliant patent regime. However some western governments and MNCs do not accept this. A fair amount of lobbying has gone towards revising the policy. The democratization of the implementation of the IPR policy is another noteworthy proposal underlying the new IPR policy. But the fact that the IPR policies can be reviewed and updated leaves one with a worry whether some of the TRIPS flexibilities built into India's IPR regime which has made India's TRIPS compliant IPR regime a sort of model for the

developing world would be subjected to change in response to intense lobbying to the effect by a sort of “ambulance chasers” among MNCs and countries.

**Table 1: Historical evolution of Science and Technology Policies in India**

Title of policy	Scope
1. Scientific Policy Resolution, 1958	<p>to foster, promote, and sustain, by all appropriate means, the cultivation of science, and scientific research in all its aspects - pure, applied, and educational;</p> <p>to ensure an adequate supply, within the country, of research scientists of the highest quality, and to recognize their work as an important component of the strength of the nation;</p> <p>to encourage, and initiate, with all possible speed, programmes for the training of scientific and technical personnel, on a scale adequate to fulfill the country's needs in science and education, agriculture and industry, and defence;</p> <p>to ensure that the creative talent of men and women is encouraged and finds full scope in scientific activity;</p> <p>to encourage individual initiative for the acquisition and dissemination of knowledge, and for the discovery of new knowledge, in an atmosphere of academic freedom;</p> <p>and, in general, to secure for the people of the country all the benefits that can accrue from</p>

	<p>the acquisition and application of scientific knowledge.</p> <p>An interesting aspect of the Scientific Policy Resolution was its emphasis on creation of qualified scientists and engineers for</p>
<p>2. Technology Policy Statement, 1983</p>	<p>The main aim of this policy was for the country to achieve technological self – reliance. It laid emphasis on domestic technological development and at the same time acquisition of technology from abroad. The policy also aimed at adapting imported technology to local conditions, absorbing the imported technology and thereby developing local capabilities.</p>
<p>3. Science and Technology Policy, 2003</p>	<p>The policy document for the first time emphasized the promotion of innovation in the economy. For this it proposed a very comprehensive set of measures, which included a policy for improving the quality and quantity of science and engineering workforce and for putting in place fiscal measures for incentivizing R&amp;D by firms.</p>

	Also proposed a target for GERD to GDP ratio to touch 2 per cent by 2006-7.
4. Science, Technology and Innovation Policy, 2013	The policy document has the aim of making India one of the five global scientific powers by 2020, establishing world class R&D infrastructure for gaining this global leadership, facilitating high risk innovations through new mechanisms, making careers in science, research and innovation attractive to the brightest, and enhancing skill for applications of science among the young etc. (A more detailed review of this document is outlined below)

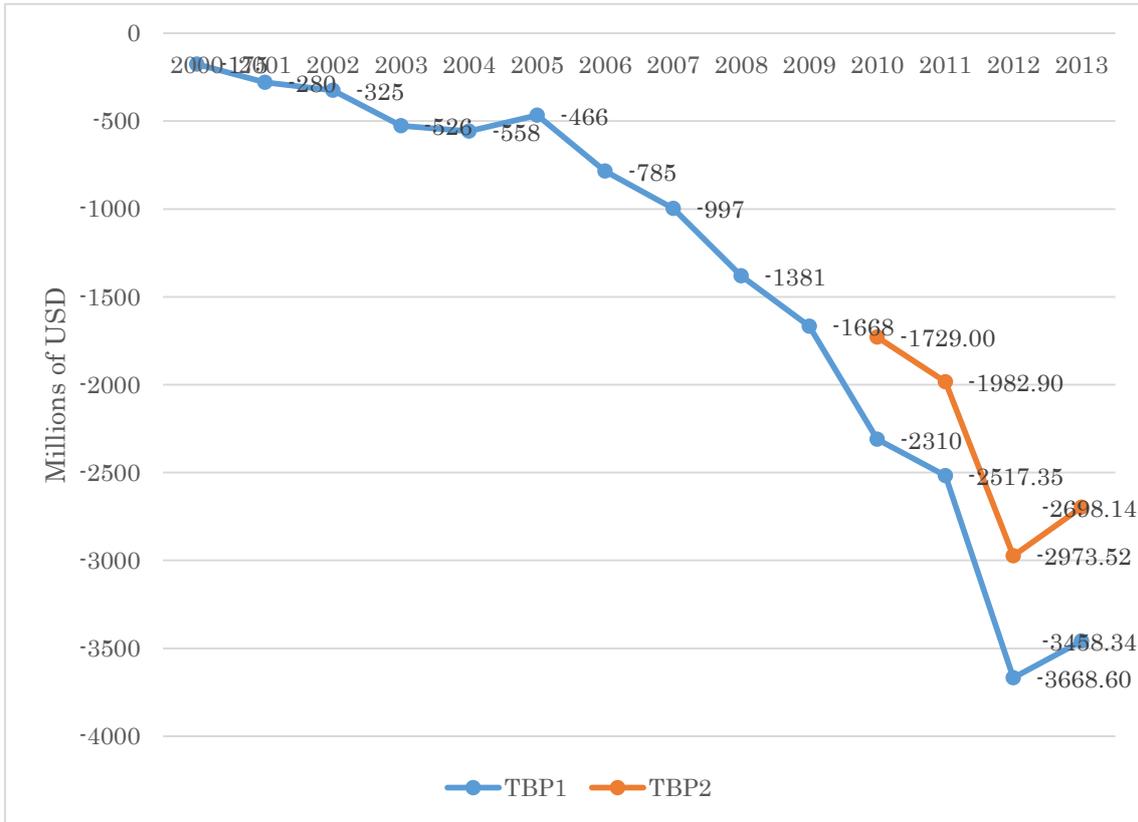
Source: Own compilation

**Table 2: Evolution of the policy on R&D tax incentives in India**

Union Budget	Major change	Scope of the change
1999-2000	R&D tax incentives of 125 per cent extended up to 2004-05	Under the current law, a weighted deduction of 125% of the expenditure made on in-house R&D is available to corporate houses up to 31.3.2000. This is now extended up to 2004-05. Further, it was proposed to extend a similar concession of permitting a weighted deduction of 125% of expenditure for R&D Projects entrusted to research laboratories and universities.
2000-01	This was raised to 150 per cent in the Finance Act of 2000	Under this, the incentive was available only to the companies engaged in the production of drugs and pharmaceuticals, electronic equipment, computers, telecommunications equipment, chemicals, manufacture of aircraft and helicopters, automobiles and auto parts.

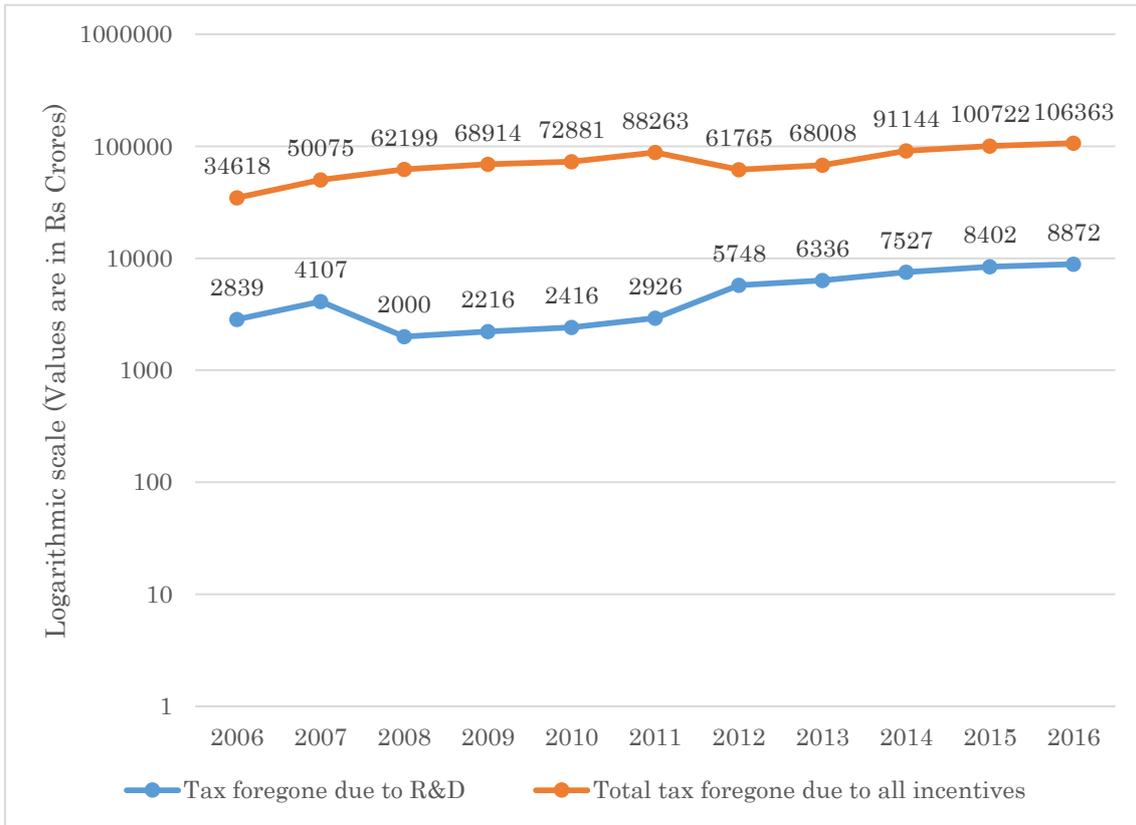
2009-10	R&D tax incentive extended to all industries in 2009-10	The scope of the current provision of weighted deduction of 150% on expenditure incurred on in-house R&D is extended to all manufacturing businesses except for a small negative list.
2010-11	R&D tax incentive increased from 150 per cent to 200 percent until 2016-17	Weighted deduction on in house R&D expenditure increased from 150 per cent to 200 per cent. Further the weighted deduction on payments made to national laboratories, research associations, colleges, universities and other institutions, for scientific research increased from 125 per cent to 175 per cent.
2016-17	R&D tax incentive progressively reduced from 200 per cent in 2016-17 to 150 per cent 2017-18 and then to 100 per cent by 2020-21	The benefit of weighted deductions for R&D would be limited to 150% from 1.4.2017 and 100% from 1.4.2020.

Source: Own compilation based on Union Budget documents.



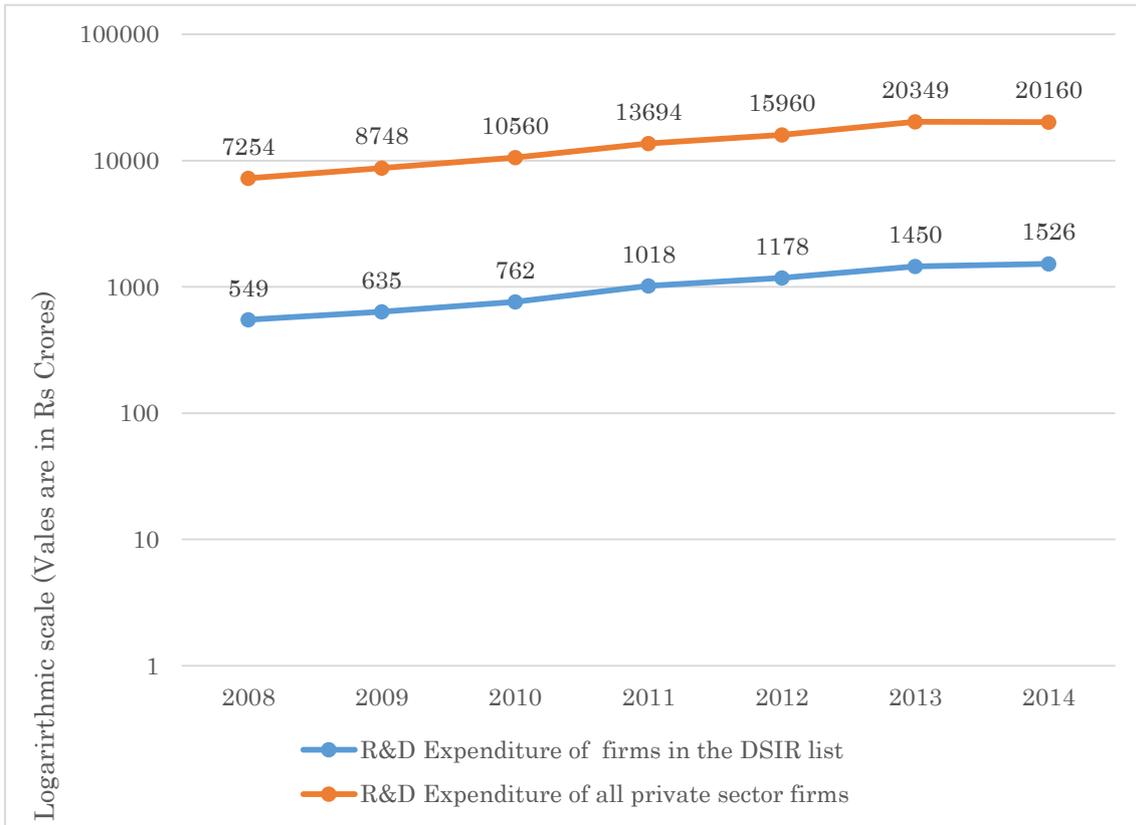
**Figure 1: India's technology trade balance including and excluding trade in R7D services**

Source: Computed from UN Comtrade



**Figure 2: Trends in tax foregone under Section 35 of Income Tax Act due to R&D tax incentives Vs tax foregone due to all types of tax incentives**

Source: Compiled from Union Budget Papers (various issues)



**Figure 3: Trends in R&D expenditure of firms in the DSIR list Vs. all firms**

Source: Prowess dataseae and Centre for Technology Innovation and Economic Research based on DSIR data

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