

Why is there no AIDS vaccine?

A new economic explanation

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Abstract

This paper aims to provide an economic explanation for the non-existence of a vaccine against AIDS. We comment on previously claimed economic reasons why private laboratories do not have incentives to invest in an AIDS vaccine and provide a new one: private companies already operate in the market for treatment of already infected patients which is threatened by the eventual emergence of a vaccine that cuts the cycle of infection. Finally, we discuss some mechanisms to provide incentives for further private research in diseases where a treatment product already exists.

Keywords: AIDS, vaccine, treatment, incentives, investment, research.

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Introduction

Nearly 30 million people have died since the AIDS epidemic was first diagnosed in the mid-1960's.² There are currently 40 million people in the world³ suffering from this syndrome⁴, and the infection rate has risen to more than 15,000⁵ new people infected daily. AIDS affects mainly poor countries.⁶ In 2001, 79% of total world deaths caused by the HIV-virus occurred in Sub-Saharan African countries. In the last five years infection rates have alarmingly increased in Asia and South America, and currently 95% of new AIDS infections occur in developing countries.⁷ Because relatively few cases are reported, the number of infected patients in some areas such as Eastern Europe and Central Asia is probably four to five times as high as the official figures show.⁸

The pattern of infection is also very different between rich and poor areas. Currently, on the one side, most AIDS patients in rich countries are, middle-class individuals with mainly homosexual and bisexual behaviour and low income individuals infected through the use of illegal drugs.⁹ In contrast, most patients in developing countries have been infected via heterosexual behaviour and through parental contagion. Additionally, attitudes towards risk of being infected are extremely different in both areas, with much more cautious behaviour in rich countries than in poor ones in recent times.¹⁰

² World Health Organization (1999), UNAIDS (2001).

³ UNAIDS (2001).

⁴ According to the medical definition, AIDS is a syndrome and not a disease. Here we just account for the number of people suffering the manifestation of the infection, which is commonly named as AIDS. We do not offer figures for the number of people infected with the virus.

⁵ Kremer (2000).

⁶ Throughout the paper, when we refer to "poor countries" we mean developing countries.

⁷ World Health Organization and UNICEF (1998).

⁸ Dr. Peter Piot, Executive Director of the joint United Nations program on HIV and AIDS. The New York Times. 29 November 2001.

⁹ UNAIDS (1999).

¹⁰ Phillipson (1993).

Deaths Caused by The AIDS Epidemic in 2001	
Sub-saharian Africa	2 300 000
South and Southeast Asia	400 000
South America	80 000
Far East and Pacific	35 000
North Africa and Middle East	30 000
Caribbean	30 000
East Europe and Central Asia	23 000
North America	20 000
West Europe	6 800
Oceania	120
Total World Deaths	2 924 920

Source: UNAIDS, November 2001.

Given these different characteristics of the epidemic in different areas, there are different means of tackling the problem that prove themselves more suitable for different zones. The medical literature distinguishes between two kinds of measures against an epidemic: preventive and curative methods. The latter are treatment products that help to alleviate the symptoms and, in some cases, totally cure infected patients. The former consists of any sort of prophylactic mechanisms, from contraceptive sheaths to vaccines, which aim to protect from being infected. Expensive and complicated treatments where many pills have to be consumed in a specific order many times a day are not feasible in developing countries. Contraceptives such as condoms may not be appropriate for areas with strong cultural or religious bias against such use. The AIDS epidemic is precisely prevalent in a part of the world where access to treatments is difficult and where cultural and religious

beliefs still influence behaviour over health considerations. Therefore, the medical community agrees that a cheap one-shot vaccine administered universally prior to infection would be crucial to stop the ongoing spread of AIDS.¹¹

Not all infectious diseases share the characteristic that they can be fought against with both prophylactic and therapeutical measures. In this article, we argue that the previous existence of one of these two kinds of mechanisms prevents resources from being spent on research for the other. In the case of polio, once the patient is infected there is no medical possibility of cure¹² and thus, no treatment product can be created against it. However, a preventive polio vaccine was discovered in the seventies. In the case of other diseases such as AIDS, malaria or tuberculosis, patients can be treated and some sort of treatment product exists; however a preventive vaccine is far from being discovered. The previous existence of a product that, although not optimal as a medical solution, is sold to infected patients might give incentives not to spend additional resources in finding a better cure.¹³

Characteristics of the AIDS market¹⁴

Vaccine research is expensive. Experts in pharmacoeconomics estimate that the average investment for an innovative medicinal product is \$200-500 million¹⁵ but in the case of an AIDS vaccine costs might be much higher. In 1999, \$350 million was spent by the public and private sector on AIDS vaccine development, nearly two-thirds of this amount having been disbursed by the National Institutes of Health in the USA¹⁶ but still no vaccine has been discovered. Some laboratories even claim that a vaccine might never be discovered.

¹¹ The Economist (2000).

¹² Polio affects to neurones, a type of nervous cell that does not regenerate, and thus, no treatment is possible.

¹³ One may argue that flu is a disease where treatment and vaccine co-exist. However, every year the flu virus is different, and so we can claim that each year the vaccine is different. General existing treatment products against flu have not proved to be as efficient with every year's virus and thus, new products are also developed every year. Therefore, it is not true that an efficient treatment product exists always prior to the current year's vaccine.

¹⁴ We will call the market for anti-AIDS products, both treatments and vaccines "AIDS market" from now on.

¹⁵ Schieppati (2001).

¹⁶ Batson (2001).

Vaccine research is also uncertain. The clinical success rate for new drugs is very restricted as only one in every 1,000 candidates progresses to clinical trial, of which only 29% are approved for marketing.¹⁷

Due to research costs, uncertainty and the general concern of public institutions for health, public and private collaboration exists in pharmaceutical research although both have different objectives. The private sector cares about future profitability of new drugs discovered. The public sector worries about health protection at the same time that it cares about stimulating economic and industrial development. Under a proper system of incentives it is possible to establish mechanisms that bring both private and public objectives closer, and thus, make collaboration between private laboratories and public health institutions more productive. As the market for AIDS drugs is currently regulated, it seems the private sector lacks incentives to invest in further research, since 85% of the existent anti-AIDS drugs were discovered due to public academic research¹⁸ and in 1998 less than 200 scientists in the private sector were dedicated to work related to AIDS vaccines.¹⁹

The public sector does not only intervene in the pharmaceutical market by performing public research but, more importantly, it regulates private behaviour. The public sector is powerful when dealing with laboratories and they use this power actively. This power comes from three different sources: 1) in most countries, governments act as the main buyer of pharmaceutical products from private laboratories. This monopsonistic relation allows the social planner to bargain for the price and the characteristics of the product for which it is the main buyer. 2) Governments regulate property rights such as patents, and can decide to what extent the patent protects the intellectual property of the company making a discovery. 3) Governments decide whether or not to allow a drug to be distributed in its territory, and in the case of lack of agreement with the laboratory, they can always claim that

¹⁷ Schiepatti (2001).

¹⁸ Webber and Kremer (2001).

¹⁹ Batson (2001).

the new drug to be introduced does not satisfy some minimum requirements of safety and therefore they can threaten laboratories with not authorizing it for sale.²⁰

However, the public sector uses its power not always against the profits of private laboratories. It is not clear that governments regulating drugs prices in many countries affect private laboratories' profits negatively.²¹ Additionally, most private pharmaceutical research receives tax exemptions or public subsidies.²² We do not want to discuss the role of the public sector in the pharmaceutical market, what we want to study is how the interaction between the public and the private sectors affects the private incentives to devote resources to research for an AIDS vaccine. We do not even want to argue that economic reasons are the most important to explain the non-existence of a vaccine.²³ What we claim is that a combination of public and private research will increase the probability of discovering a preventive vaccine against AIDS and we ask why vaccine research might not be attractive for private companies.

What has been done up to now?

To encourage private vaccine research, public health institutions have been basically subsidizing it, hence, lowering the actual cost of research. The US Administration established in April 2000 a \$1.5 billion tax credit for HIV research and both the World Bank and the European Union have recently announced similar plans.²⁴ There have also been subsidies from the non-pharmaceutical private sector, the Bill Gates Foundation being one of the main private contributors to AIDS vaccine research.

²⁰ Of course, there is regulation to prevent the use of power in this sense, such as independent agencies regulating the approval of new drugs. Additionally, this third source of power is not only used to obtain a better bargaining position with laboratories but also to avoid the existence of many similar drugs that fight the same disease. The problem of the "me-too" drugs is claimed to be one of the main reasons of the increasing costs of Health Systems (Montero, J., Rey, J. and Rey, P. (1999)) and it is an issue under current debate.

²¹ A clear example is Spain, where the government sets prices for all drugs which need prescription, but it also fixes a 27% profit margin for the seller, much higher than the profit margin normally obtained in other markets.

²² Rey, J. and Rey, P. (2001).

²³ Of course it is not only that research in AIDS vaccines is costly and thus not attractive for private capital to invest in it. It also that research is difficult as the HIV virus has the capacity to mutate and therefore an effective vaccine should be able to fight against such mutations.

²⁴ However, the medical journal *The Lancet* (2001) estimates that the currently need for AIDS funds to treat world HIV patients adds up to \$9.5 billion.

However, most of the pressure of international health institutions as the World Health organization (WHO) has been used to try to lower the price of private treatment products for HIV infected patients in poor areas. The South African parliament approved in 1996 legislation that allowed the country to import generic versions of patented drugs and permitted compulsory licensing so that local companies could manufacture generic drugs, with a much lower cost. The Brazilian government also launched a similar plan, which caused the number of AIDS related deaths to be halved since 1995.²⁵ The pharmaceutical industry responded with a legal suit against these governments under the argument that patent protection is essential to encourage further research on new medicines and that the main problem of these countries is not the high costs of drugs but the conditions of poverty, ignorance and corruption in which these countries live. After an intense fight,²⁶ on November 2001 the World Trade Organization (WTO) Meeting in Qatar agreed to allow poor countries to by-pass some drugs patents and thus produce some pharmaceutical products at a lower price in order to maintain Public Health. However, the problem is far from solved, as the agreement only allows poor countries to produce, not to import, these drugs at low prices, and most of these countries lack the industrial capacity to produce pharmaceutical products.²⁷

Most of the policy measures taken are aimed at the already existing market for treatment products for infected patients. The main aim of these policies is to wider access among poor countries to existing drugs and thus, there is no impact to research in new products, such as vaccines. Additionally, although it is too early to pronounce on the consequences of the Qatar Agreement, it may affect the incentives of private laboratories towards their research programs. In particular, it will help them to claim that, under the new conditions, they cannot be asked to produce vaccines if they are not guaranteed patent protection.

Why is there no vaccine?

²⁵ UNAIDS (2001).

²⁶ Also after some companies started to lower the prices of their treatment products.

²⁷ British Medical Journal (2001).

Two economic arguments have been previously given in the literature to explain the existence of “orphan drugs”²⁸, such as vaccines, in which private laboratories hardly invest. The first one is that poor markets, which cannot compensate the costs involved, are the ones which mainly require research. While 50% of global health R&D in 1992 was undertaken by the private industry, less than 5% was spent on diseases specific to the less developed countries.²⁹ The second reason is that, even if the investment is successful, laboratories will be placed under international pressure to price the vaccine low so that the majority of the global population can be vaccinated, in order to break the cycle of infection.³⁰

Vaccines are international public goods where no single country has sufficient incentives to encourage domestic private research alone. This is mainly due to the externality of consumption of vaccines.³¹ Therefore the most recent literature³² argues that policy measures to encourage research must include an international commitment to purchase vaccines at a high enough price to recoup private investment. These authors claim that a commitment of this type would solve the credibility problem³³ and would allow, once an international institution has bought the right to the vaccine, to price it as low as desired to vaccinate the policy maker’s target population. Additionally, they claim that a commitment of this sort would be much more efficient than ex-ante subsidies, which only lower the cost of an investment that, when treatment exists, might not be attractive in any case for private laboratories.³⁴

However, what we want to argue in this paper is that in the concrete case of epidemics such as AIDS, there is an additional important economic reason why private laboratories are not interested in doing research in a vaccine. The pre-existence of a privately developed treatment product for infected patients might prevent resources from being spent on a product directed to cut the inflow of people getting infected. After all, if you are already

²⁸ Médecins Sans Frontières (2000).

²⁹ Webber and Kremer (2001).

³⁰ Rey, P. (2001).

³¹ Vaccination does not only affects an individual’s utility but the utility of all the other individuals who might have been infected by that individual. This externality extends across all individuals.

³² Batson (2001), Juma (1999), Kremer (2000), Kremer (1996), Watal (2000).

³³ Ex-ante, governments want to claim that they will allow for high prices of vaccines, while ex-post, once the vaccine is discovered, the incentive to price the vaccine low is so high that makes these claims not credible.

³⁴ For an excellent discussion on the implementation of such mechanisms see Kremer (1998).

obtaining profits from your market, why should you invest in creating a new market that will compete with your existing one?

Our claim applies to all those markets where there is scope for making the existing product being sold better and companies have to decide whether to invest additional resources in creating this better product. The standard R&D literature, a firm will invest in a product that substitutes the old one if the expected profits from the new product compensate for the disappearance of the old one and for the costs of research. However, in the market for a potential AIDS vaccine both conditions may not be satisfied. While the standard multi-drugs combination treatment is sold to rich countries at a cost that amounts between \$10,000 and \$16,000 per patient yearly,³⁵ an effective preventive vaccine that suits poor countries, would be administered few times to the same patient and at a much lower price. Therefore, the actual demand for vaccine, which includes demand from developing countries, is much poorer than the potential demand of only rich countries ready to pay a high price for the vaccine. In addition, the uncertainties and costs associated with unsuccessful vaccine research make the possibility of creating this market much less attractive for private investment.

We argue that the existing treatment market and the potential market for vaccine compete in the sense that both the prices that can be charged in each market, the demand for each product and the infection rate of the epidemic will be affected by the interaction of the two markets. A vaccine prevents potential patients from getting the infection; therefore it is a good for which consumers will be willing to pay a higher price than for treatment, which basically only alleviates the symptoms. Thus, if a vaccine exists the maximum price a company can charge for its treatment product will be lower than if a vaccine does not exist. Additionally, a vaccine lowers the infection rate dramatically as vaccinated consumers cannot infect non-vaccinated ones. Therefore a vaccine reduces the future demand of treatment and thus, both products compete, even in the case that both drugs are produced by the same laboratory.

³⁵ Webber and Kremer (2001)

In a companion paper,³⁶ we develop a game theoretical model in which we prove that even if a private laboratory is able to charge a high monopoly price for the vaccine, assuming that demand comes from a population with income high enough to pay such a high price, and additionally assuming that there is not uncertainty about the success of vaccine research, the company may not be willing to sell the vaccine. All that is needed to assume is that the laboratory is patient enough, i.e., that it worries about its discounted future profits. The reason is simple: an effective preventive vaccine will lower the maximum price a laboratory can charge for its now less attractive treatment product and ultimately, if the vaccine is successful and its distribution extended enough among the population, it will make both the market for treatment and the newly created market for vaccines disappear in the long run. In a dynamic setting, the longer a laboratory waits to introduce the vaccine the more it enjoys the high profits of the treatment and the less it is willing to cut those profits by introducing a competing vaccine. Therefore, no private company selling in a treatment market will invest significant resources in research for an AIDS vaccine.

There are two lines of arguments against this model. First, one may argue that a new laboratory that does not operate in the AIDS treatment market may have incentives to develop a vaccine and steal in one shot both the markets of treatment and vaccine from its competitors. However, in a market with huge uncertainties about the success of the research as the pharmaceutical one, previous knowledge about the disease is essential. We claim that firms only acquire the required knowledge to make successful vaccine research by having previously invested important resources in studying the disease. Therefore, the current situation is that only laboratories which have done previous research for treatment products are in a position to develop vaccines. Once laboratories have clustered on an equilibrium where they all sell treatment there are few incentives to deviate and threaten not only their competitor's share of the market but also their own.³⁷

³⁶ Rey, P. (2002) Forthcoming..

³⁷ Currently there are five private companies claiming to be doing vaccine research, and they all sell some sort of AIDS treatment in the market. WHO (1996).

Second, one may ask what is so special in the case of AIDS that prevents a vaccine from appearing. After all, there exist vaccines against other epidemics, as the already mentioned case of polio, which were developed by private laboratories. A first defence is that the distribution of other diseases was much less biased towards low-income countries. As an example, of the 1233 new drugs patented worldwide between 1975 and 1997, only 13 were directed towards tropical diseases (the ones that affect primarily poor countries) and furthermore, only 4 of these 13 were discovered by private laboratories.³⁸ It is even more remarkable that in cases such as malaria, when a privately funded research team claimed in 1994 to have found a possible vaccine and then freely donated it to the World Health Organization, private laboratories started an expensive public campaign against the validity of such vaccine.³⁹ However, this defence is not very strong if what we want to argue is that regardless of the income that demanding countries have, laboratories do not have incentives to develop vaccines when treatment products already exist.

A second line of defence for our model is provided by the fact that most important vaccines were discovered when an effective treatment product against the disease did not exist and, most importantly, due to the characteristics of the disease, a treatment product is impossible to develop. With respect to this, we have already mentioned the case of polio, where no possible medical treatment can be created because the cells that the virus attacks cannot regenerate. However, AIDS is a different type of infection. Although on the early days of the diagnosis of the epidemic, it was claimed that a cure was impossible it turned out to be that existent multi-drugs treatments are successful in both lowering the rate of infection and increasing the life expectancy of infected patients.⁴⁰ It is the next step, discovering a preventive vaccine, which is proving more difficult.

³⁸ Sala-i-Marti (2000).

³⁹ Rey, J., Rey, P. (2001).

⁴⁰ WHO (1998) argues that, when available, the standard multi-drugs treatment reduces the infection rate by 67% and increases the life expectancy of HIV infected patients which have not develop the syndrome by more than 5 years. The lower infection rate when treatment is provided is due to a lower proportion of virus on the infected patient. However, an effective preventive vaccine would lower the probability of the vaccinated individual to infect any other to zero.

Policy discussion: what can be done?

AIDS was first diagnosed in the rich countries during the seventies. Although it is probable that the epidemic had existed for much longer, it was not until then that health institutions from rich countries realized the magnitude of the problem and planned a strategy against it. A solution was urgently needed and all types of research were subsidized in order to provide a cure. This strategy proved to be successful, since by the beginning of the nineties, a standard treatment is commonly administered to infected patients in rich countries, even though it does not reach the poor areas where the epidemic is mainly concentrated.⁴¹ However, urgency is a bad guide when taking policy decisions. If policy makers had been more patient and demanding, it is possible that a final solution to the problem, i.e., a cheap vaccine, could exist nowadays. By spending expensive resources in encouraging any sort of research they have helped to create a treatment with the perverse characteristic that it is unsuitable for the majority of the infected population. Most importantly, the subsidized treatment solution impedes the incentive to undertake additional research to find a better one.

Our result has important general policy implications. When a social planner wants to encourage R&D it needs to be extremely cautious about the first steps that are taken. Fast solutions decided in a moment of emergency can influence the future path of the problem and, as we see here, can even prevent the final preferred solution from appearing. In order to change that path, additional resources will be needed and the total cost, together with the time loss of an erratic policy can be important.

We want to stress that it is not only private laboratories' incentives which caused a situation where the existence of a treatment product makes the appearance of a vaccine difficult. Public policies, orientating research in the form of subsidies, tax exemptions, price constraints, etc... may also have had a negative effect on the failure in discovering a vaccine for AIDS.

The purpose of this section is to provide some suggestions on how to design correct policies that provide better incentives to private companies to spend more resources on

⁴¹ Of the 25 million people who have HIV/AIDS in Africa, only about 10,000 are being treated with drugs. UNAIDS (2001).

research on vaccines, in the light of the limitations we outlined previously. We do not ask the normative question of whether there should be intervention in the market for an AIDS product. We believe this question lacks content as it is naive to assume that governments are not going to use their purchasing power in this market in order to reach their objectives. On the contrary, what we propose here are some first insights into why the usual mechanisms to encourage R&D will not work as well in the market for vaccines. Finally we discuss some alternative measures that can be considered. Before starting we want to point out that although the majority of the paper has been focused on AIDS, most of it, especially this policy section, applies to other diseases which mainly affect poor countries, such as malaria and tuberculosis, where some treatment products that does not reach poor countries exist and a final vaccine is far from being intensively investigated.

Supporters of the free market economy might argue that the main problem in the pharmaceutical industry is that there is too much intervention.⁴² They claim that if governments did not threaten firms to not respect future intellectual property rights, private companies would provide what the market demands, i.e., a vaccine for the proportion of people who can afford a price high enough to recoup research costs. Free markets supporters do not realize that even their proposal is not entirely efficient from a neoclassical point of view. The market for vaccines is distorted because the consumption externality relating to the probability of infecting other consumers is not taken into account. However, the argument that an economy, in the absence of intervention, will come up with a vaccine with the characteristics that the market demands is dubious. Although it might be possible that before a treatment existed private laboratories could have obtained higher profits from developing a vaccine than from developing a treatment, once the treatment exists it may no longer be in the industry's interest to spend resources on a product that will make its established treatment market disappear in the long run. Additionally, free market supporters do not realize that the uncertainties associated with the success of research on a vaccine, tremendously big as

⁴² Rodríguez Braun (2000).

research is dealing with a virus with the capacity to mutate, can be alleviated via public intervention.

Hence, public intervention not only has advantages but it will also occur for sure. We now discuss some of the already proposed incentive programs to bring private returns closer to social returns and therefore, increase investment and thus, the probability of discovering a vaccine.

The literature on R&D distinguishes mainly between push and pull programs. Push programs provide ex-ante funding for vaccine research.⁴³ Pull programs increase ex-post rewards for development of vaccines. Therefore, the distinction is basically whether the social planner pays in advance to encourage research or whether it pays after the discovery has been made.

Most examples of push programs consist of some kind of subsidy being transferred from a public institution to private companies. Grants to academics, public equity investments and research tax credits are three good examples of push programs. Paying ex-ante to encourage investment has the main advantage that the subsidizer does not need to specify the characteristics of the product it is helping to discover. In the case of a vaccine, where the successful line of research is far from being known, this characteristic may be useful as the social planner can diversify risk between different research approaches. Additionally, as researchers are not competing for a final price, only for this year's subsidy, it might give incentives to share initial knowledge from different projects that will increase the probability of finding the right line of research.

On the other hand, pull programs pay ex-post to the successful laboratory making the discovery. Some examples of these programs are the right to extend patents over time, tournaments, or what it has been claimed as the best solution to the AIDS problem: patent-buyouts. Pull mechanisms have the advantage over push mechanisms that they do not need to decide between competing projects and that they do not incur a cost unless the reward, i.e., the discovery has been made. By doing so, pull programs lower firms' incentives to be

⁴³ Nadiri (1993), Wright, B. (1983).

overoptimistic to try to get a subsidy. Additionally, the social planner can specify the characteristics of the product it is subsidizing and therefore promote those lines of research that aim for a more complete solution, in this case a vaccine that is also suitable for poor countries.

However, the main advantage of pull mechanisms over push ones is that in the context of vaccine development, push programs are not efficient at all. Push programs would be practical if the main problem for laboratories was that research costs are high or that there is too much uncertainty on the probability of being successful in developing a vaccine. These two conditions are clearly present in the market for AIDS. However, it is not only the uncertainty or the cost of investment that prevents laboratories to spend resources on research for vaccines but the threat to the market of treatment that they already have established. It is the possibility of a vanishing treatment market that stops laboratories from creating a new market full of uncertainties. No matter how high the subsidy is, and therefore how cheap it becomes to invest in vaccines for the laboratories, it is not in their interest to invest in the creation of that market at all. Therefore, what is needed is a mechanism that while encouraging a vaccine, maintains the total profits that the laboratory obtains from the treatment market.

It is also important to see that a reason why push programs will not be effective is due to credibility problems. A government might be giving subsidies to do research on vaccines but that policy needs to be consistent with respecting the property rights of the product being discovered. If a policy maker is committing to allow a private company to charge its desired price in the event that the market is created it needs to do so with a credible policy. However an ex-ante subsidy is not credible because once the vaccine exists, commitment is no longer important and the temptation to put pressure on low prices and allow for a wider extension of vaccination programs is too attractive a possibility for the government.

Thus, we conclude that only pull mechanisms are suitable for stimulating research on vaccines. By paying the subsidy ex-post, a pull program alleviates the commitment problem

public institutions face. If a government or, more probable, a coalition of international governments, commits to buy the patent once the vaccine is discovered it can do it for a price high enough to compensate for the possible future disappearance of the markets. Additionally with a high enough monetary transfer, the policy maker can buy the distribution rights of the vaccine and thus vaccinate all its target population. This is basically what constitutes a patent buy-out. We would like to end up by pointing out that we are aware of the budgetary problems and the tax distortions such a policy could create and that is one of the reasons why we argue for global action. A much more careful description on how to implement such mechanisms and other recommendations for policy analysis can be found in Attaran et al. (2000). However, the purpose of this paper is not to discuss such policies but to argue that the already proposed pull mechanisms are a sub-optimal solution that has to be considered once a treatment product already exists. If the problem of treatment products and a vaccine competing had been taking into account ex-ante, maybe time and resources could have been saved, and we would not have to worry about how to give additional incentives to private laboratories to do research in a product that might, once treatment exists, not interest them after all.

Conclusion

We have developed an economic argument to explain why a vaccine against AIDS has not been discovered yet. Although it is common knowledge that the technical difficulties to succeed in research for this vaccine are huge, we provide an alternative approach under the assumption that more investment will increase the probability of discovery. We then argue why private laboratories have no incentives to devote resources to investment in vaccines for AIDS. The reason is not only that pharmaceutical companies fear that they will not be able to recover their research costs but, more importantly, that the appearance of a vaccine will compete with the market for treatment products in which they already obtain profits for which they would also need to be compensated.

Finally, we want to stress that this is just a preliminary approach to this issue and that a companion paper, which includes a formal theoretical model which contemplates the incentives of laboratories, governments and patients will follow. Empirical work should also follow, to test the real effects of some of the policies we are proposing and to contrast with data the importance of the effect of competition between treatments and vaccines. In any case, we expect to have opened a line of debate on an issue with important implications for the future.

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