

## Risk controls viewed as Rx for medical research funding

By: [Christine Williamson](#)

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Three MIT researchers have produced an interesting proof of concept: Financial engineering can substantially reduce the risk of funding biomedical innovations.

In a paper published in the September edition of *Nature Biotechnology*, co-authors Andrew W. Lo, Roger M. Stein and Jose-Maria Fernandez expressed their concern that biomedical innovation, especially cancer research, is being stifled by a lack of funding.

That's because "it is high risk. We wanted to apply the tools of modern financial engineering — which seek to control risk — to funding early stage drug development programs," Mr. Stein said in an interview.

"What we found through our research is that although risks do increase when investing in early-stage drug projects compared to later-stage projects, the risks are calculable and therefore can be managed to some degree," he added.

Mr. Lo is the Charles E. and Susan T. Harris Professor, a Professor of Finance, and the Director of the Laboratory for Financial Engineering at the MIT Sloan School of Management, Cambridge, Mass. Mr. Lo also is chairman and chief investment strategist at hedge fund manager AlphaSimplex Group, Boston.

Mr. Stein is managing director-research and academic relations, Moody's Corp., New York. Mr. Fernandez is a research associate at Laboratory for Financial Engineering at the MIT Sloan School of Management.

The biomedical funding concept is fairly straightforward.

The authors argue that an investment fund can invest in a large number of biomedical drug-research programs at various stages of development, which will diversify the portfolio. Issuing debt through securitization will mean even more money can be raised. Institutional investors and others could be attracted by regular payments of principal and interest as well as shorter maturities.

Based on historical data about new molecular cancer therapies from 1990 to 2011, the trio found that funds of between \$5 billion and \$30 billion may yield annualized returns of between 8.9% and 11.4% for equity holders and coupon payment of between 5% and 8% for "research-backed obligation" holders.

The paper, "Commercializing Biomedical Research through Securitization Techniques," notes that these returns are lower than typical venture capital funds would produce but are "attractive to pension funds, insurance companies and other large institutional investors" because they are less risky due their greater diversification.

Mr. Stein said the collaborators hope that their paper will inspire a philanthropist, charitable foundation or money manager to start such a fund.

And the authors seem to be suggesting a slight leap of faith, in addition to their rigorous proof of concept presented in the paper.

“Proposing to raise billions of dollars for biomedical research in the current economic climate may seem ill-timed and naive. However, today’s low-interest-rate environment is, in fact, ideal for issuing long-term debt and investors around the globe are desperately seeking new investment opportunities that are less correlated with traditional asset classes.

“Instead of asking whether we can afford to invest billions more at this time, perhaps we should be asking whether we can afford to wait,” the paper said.

“Our goal was to get people thinking about this issue, and we really want people to explore alternative sets of assumptions,” Mr. Stein said.

To that end, the co-authors are willing to share the software containing their assumptions and would welcome feedback, Mr. Stein said. Requests should be directed to Mr. Fernandez at [jose-maria.fernandez@sloan.mit.edu](mailto:jose-maria.fernandez@sloan.mit.edu).

The paper is available for a fee at <http://www.nature.com/nbt/index.html>.

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