In one sentence, can you describe your field?
I am an applied micro economist, and my research is on health economics and industrial organization. My main interest is in the health market, and my favorite way to describe my work is by means of a “three-circle” diagram. Each circle represents a “party,” so there are insurer, provider and consumer. The economics of the health market is about how these three parties interact.

Present a paradigmatic example of a model in your field. (Please describe the model in terms that are accessible to non-experts).
Obviously the health market is complex; it accounts for about 20% of the GDP in the United States. There are many insurers, both public and private. There are many providers: physicians, nurses, allied health professionals. And there are about 300 million people in the U.S.! When we economists face such a complex situation, our angle of attack is to simplify. Indeed, every single research in the health economics field is about some aspect of this three-circle diagram. However, there isn’t much work that is about EVERY aspect of this diagram.
Economists are very good at simplifying things. Let me illustrate this by two examples. First, one line of research on the current health care reform in the U.S. focuses on the newly formed state and federal Health Insurance Exchanges, which are market places for consumers to buy health insurance. Of course, this simplifies the research but ignores the role of providers. Second, another line of research focuses on how physicians and hospitals organize themselves for better efficiency; this is encouraged by the health care reform. In this case, this simplification ignores consumers’ insurance purchase decisions. We simplify in order to focus on a limited number of relevant issues so that ultimately a deeper analysis can be achieved.

(2) With the help of these examples, could you explain why a model is needed? And could you describe what a model is? (in particular what are the different stages in the modelling process?)

I would argue that this is, sort of, the only game in town. When we set out to study a problem, we always begin with a specific focus. This requires us to get rid of issues that are irrelevant to our focus. Again, in the first example above, health exchange studies should not involve how pharmaceutical companies decide to advertise to consumers. And, in the second example, studies of the Accountable Care Organizations, the mode of health care delivery advocated by the U.S. health care reform, should not involve health insurance premium subsidies to those consumers with lower incomes.

What determines the boundary? How do we decide what to include and what to exclude in our research? That is when a “model” becomes relevant. I’d just say that a model is a collection of postulates, often accepted by most members of the research community, for carrying out analytical and empirical works. The collection of postulates is often quite small so that some issues are not mentioned at all. For example, the evaluation of uncertain incomes by consumers according to the expected utility hypothesis is often taken for granted. But postulates are the analytical foundations.

Modeling is the construction a simplified account of the issue of interest. To study Health Insurance Exchange, we assume that consumers have different likelihoods of becoming ill, and each must purchase some insurance. More important, we assume that firms that sell insurance policies cannot tell them apart, so they must offer the same premium. Our model of an insurance market may begin with these two postulates. It has been well established that the market may perform poorly in this model. The role of the model is to
explain how the postulates result in poor performance. Finally, we then use the model to study how Health Insurance Exchanges may reduce poor performance by regulating the insurance market.

Using the second example, we begin with the assumption the delivery of health services may be complicated by insurance. Because consumers do not pay the full cost of care, they may not have the incentive to acquire knowledge about treatment effectiveness and costs, so often use excessive and expensive care. We also assume that, without the proper incentives, health care providers do not choose the most cost-effective treatments. Our model of a care organization can simply be given by these two postulates. Now, the study of Accountable Care Organizations is concerned with how innovation in organizational structures can encourage cost effectiveness.

The reason for a model is obvious. Without a model, we do not know where to start. Without a model, we do not know how to formulate a problem. Finally, without a model, we do not know how to evaluate propositions or recommendations. Statements or results follow from some postulates, so they are meaningful only if we have listed those postulates in the model.

In the first example, consider the policy recommendation of mandatory health insurance. According to the two postulates, mandatory insurance results in better risk pooling, so market failure due to missing information can be alleviated. However, if we have not made those assumptions, we would have to think of another reason, perhaps fairness, or equal treatment for all. One policy can be given multiple interpretations depending upon the model.

In the second example, consider the policy recommendation of integrated delivery of medical services in return for a fixed, capitated payment per enrolled consumer. According to the two postulates, capitation forces providers to be responsible for costs, and integration allows the alignment of incentives among different providers. Without those postulates, then we would have to think of perhaps solidarity and social adhesion as the reason for the integration policy.

Economists subscribe to model building. But we have borrowed that from the scientists. The so-called scientific method is about models. Allow me to use perhaps one of the most amazing models in physics to illustrate. Einstein’s special relativity consists of a single postulate: that the speed of light is constant to every observer no matter at which speed
the observer is traveling. In Einstein’s own (translated) words: “the same laws of electrodynamics and optics will be valid for all frames of reference for which the equations of mechanics hold good.” (On the Electrodynamics of Moving Bodies, 1905). Einstein’s model building can also be illustrated again by his work that paved the way for quantum mechanics. He said, “According to the assumption considered here, when a light ray starting from a point is propagated, the energy is not continuously distributed over an ever increasing volume, but it consists of a finite number of energy quanta, localised in space, which move without being divided and which can be absorbed or emitted only as a whole” (On a Heuristic Point of View about the Creation and Propagation of Light, 1905).

Whereas many regard model building as consisting of many structures and substructures, etc., I think of model building as something simpler than that. Indeed, typically there are various components for any model. Although Einstein’s special relativity paper contained no reference, he did mention a few names: Newton, Maxwell, Hertz, and Lorentz. (The photoelectric paper did contain references, a total of four.) Each model is a picture of something that is of interest.

But in the models of relativity and the photoelectric effect, each one has a central cannon of construction. And that, I think, is the key to understanding models. A model puts forward a central concept: the constant speed of light, and the discreteness of light and energy in Einstein’s models. Obviously, we know now that these were revolutionary concepts. (It can be said that Einstein knew them to be revolutionary before the rest of the world would. See Einstein: His Life and Universe by Walter Isaacson, 2007. The daily lives and careers of most scientists have less drama.)

Similarly, the model on Health Insurance Exchange postulates has consumers possessing private information about their illness likelihood as the cannon of construction. The model on Accountable Care Organization has misalignment of incentives as the cannon of construction. These are probably less revolutionary than relativity and light quanta, but these are central postulates for economists for the past fifty years, during which time information economics has taken the central stage in microeconomic theory.

Of course before relativity and before light as quanta, there were other models about space and light (space and time being independent, and light being a wave). Likewise, before asymmetric information and incentive alignments, there were models about uncertainty, and models about incentive misalignment. For example, the general
equilibrium model with uncertainty, and externality and public good problems are related theories. However, they have not had the asymmetric-information aspect so critically emphasized in information economics. The terms adverse selection, moral hazard, hidden information, and hidden action were not in the dictionary of the classical general equilibrium model.

3a. What is the role of mathematics in modelling?

I think that mathematics has very little to do with the basic principles of a model. There is nothing very mathematical about consumers having private information about their likelihood of becoming ill. Likewise, it is not a mathematical statement to postulate that providers’ incentives are misaligned. The first is about information that is known to some but not to others. The second is about how some economic actors will behave. They are hardly anything mathematical! They assert something that may or may not be true. Mathematical statements are seldom like that.

Even in physics, that the speed of light being constant to an observer travelling at any speed is not a mathematical statement. Similarly, that there is a smallest packet of energy is not a mathematical statement either. These are statements about physical events or entities. One can, in principle, find these statements to be false, and the validity of these statements has nothing to do with mathematics.

The key is that a model provides the concepts necessary for understanding some phenomena or relationship between phenomena. Thus, private information is the key to understanding why a market may fail, and incentive misalignment explains why decisions can lead to inefficient outcomes.

The constant speed of light dispenses with the assumption of a permeating substance through which everything else travels. The quantum theory of light dispenses with the formal difference between gaseous and electromagnetic processes.

However, that does not mean that mathematics is unimportant in modeling. A model begins with postulates, but we put in a lot more other structures to build up the model. The theory for the Health Insurance Exchange is not just about consumers having superior information. The theory for the Accountable Account Organization is not just about incentive misalignment. These are the most important postulates. The successful postulates should be deep enough to generate further developments. And this is the art of model building. One makes a seemingly simple postulate, but its implication can be
enormous. Again, Einstein’s postulates are probably the deepest in modern physics. The acknowledgement of asymmetric information and incentive misalignment is probably the deepest in modern microeconomics.

That, I think, is where mathematics comes in. Mathematics is at its best when it is used to describe relationships. I think that the dominance of game theory in economics is precisely because of that. Game theory is a framework that is extremely good for describing interactions between individuals. The strategic aspects in any relationship can be made precise by game theory. Mathematics allows us to use the depth of postulates in a model. One can say that mathematics is a tool, but it is the most valuable of all tools. How would modern economics (or physics for that matter) function without mathematics? It would be unimaginable.

Hence, in the model for Health Insurance Exchanges, we need to describe how consumers and insurers interact. More important, we need to describe the strategic role of asymmetric information. When insurers compete, say by offering policies at various premiums, they must recognize that consumers will make sure of their superior information. Our model therefore must describe precisely how consumers can exploit their advantage. The mathematics does allow us to specify precisely what an insurer can offer and at what time; it also allows us to specify how a consumer can react based on his information. For example, the model can simply say that each insurer offers an insurance policy, which consists of a premium and a level of coverage of medical expenses, and then, each consumer picks a policy from available ones.

In the model for Accountable Care Organization, we need to describe the precise degree of incentive misalignment. Suppose that there are general practitioners and specialists, and they have to decide how a patient is to be treated. Clearly, providing treatment requires resources and effort, but the determination of the best provider requires diagnosis. Will a general practitioner have the incentive to diagnose and refer a patient to a specialist purely based on cost-effectiveness? Likewise, will a specialist diagnose and refer a patient to a general practitioner for cost-effectiveness? The complete model will have to specify the financial incentives and professional concerns among physicians. It must also specify the consequences of referrals, both to physicians and patients. A game-theoretic model again specifies which physician can do what and at what time. It also specifies possible reactions by other physicians and possible outcomes to patients.
A mathematical model spells out the precise strategic interaction in any relationship. I can liken it to a play. There are actors (providers, insurers, consumers), and then there are the sets (the market, regulated or competitive), and then there are rules that the actors must follow when the play unfolds (what kind of contracts are allowed in the market, what are feasible regulations). Of course in a play, actors may not exactly follow the director’s instructions. In a scientific model, all actors must follow rules that are well specified and accurate.

Precision facilitates discussions, revisions, and new developments. It’s just a matter of ordinary academic life and scholarly pursuit that researchers argue about this and that. Well, it’s better that we can all agree on what we are arguing about---even though we may not agree!

There is also a practical advantage of a mathematical model. Mathematical theorems are proven propositions. They are universal; their truth or falsehood is context free. If my model employs a certain optimization problem, and some theorem tells me the characterization of the solution, then that’s it. I have found the solution---or others have found it for me. No ifs, ands or buts! Mathematical theorems are never wrong. They can tell me what my results are---even if I don’t understand them! And that’s the big question. Sometimes we may know the solution, but we may not be able to comprehend what it means. I like to say to my students, “Mathematics is never wrong, but it won’t tell you anything. It’s your responsibility to understand the mathematics.”

3b. What constituents besides a mathematical formalism are part of a model?

As I said, foundations of a model are almost always not mathematical. How these principles are to be used require other building blocks. And often, the scaffolding to put everything together requires mathematics. It is as if mathematics provides all the linkages.

Allow me to use a construction example. We have a foundation of a building. Then we need to decide how tall it can be, and whether an elevator or an escalator is used for transporting occupants up and down. Then we may have to decide on partitions, electricity, plumbing, windows, etc. Obviously, all these require compatibility. A two-story building may well have escalators as the only means for travel up and down, but an elevator is better when the building is ten stories tall. Then if we build a warehouse, the partitions and amenities aren’t that critical. But if we build an office, then windows and
electricity are more important, but elaborate showers and kitchens are not needed. However, if we build an apartment complex, then partitions and kitchen designs are very important.

So if we have a model that says consumers have superior information about their health conditions, we still have to decide other components of the model. Are there going to be many firms, or just one firm? The former will be about a market, so we should describe how firms interact, and what kind of insurance policies are allowed. The latter setup will be about a monopoly. Often in market situations, we let insurance policies be quite simple: one combination of premium and coverage is to be offered by each firm. But for a monopoly, we may want to allow more complex policies, such as a menu of premium-coverage pairs. Finally, if we want to investigate long-term effects of asymmetric information, then we consider many rounds of interactions between consumers and firms.

Again, if we have a model that says providers have incentive misalignments, we still have to decide how they interact. Are there going to be just one general practitioner interacting with one specialist, or many interacting with many? What kind of instruments, or financial arrangements, can providers use to solve incentive misalignment problems? Can they hire an auditor? Can they keep track of referrals and their outcomes, either clinical, financial, or both?

The constituents are not quite mathematical; they are the necessary components in order for a model to focus on one, or a few, issues. The model begins with some basic principles, and then we build them up. There are many, many ways to go. However, there is a limit as to how components can be fitted together. One is not going to construct a building that can withstand salt-water corrosion; that requirement---corrosion resistance—is for boats, not buildings. However, the components have to be fitted together in a mathematical way, just like various floors of a building must obey the laws of physics in terms of balance, weight, height, etc. Likewise, insurance policies offered by firms have to be defined mathematically, and they must also respect the missing information constraint (which usually means a certain measure-theoretic restriction).

3c. What is the role of language in modelling?

I guess that by this time, I have given the impression that economic modeling is not that mathematical. Many models are described verbally. Of course, there is mathematical notation, symbols, expressions, formulas, equations, etc., but the economist just links them together using a common language.
More important, the professional vocabulary---the jargon---is English, so the meaning and connotation typically have everyday origins---in the English-speaking world. A native English speaker has an advantage when it comes to writing economics papers---everything else equal.

We use a language to communicate our thinking. In the current academic environment, English happens to be that universal language for economics papers. Economic modeling requires critical and clear thinking. Hence, as long as a language can be an efficient vehicle to communicate critical thinking, it would be enough. No matter which language we happen to use, if thinking is muddled, then only muddled ideas can be communicated. Communicating muddled ideas clearly isn’t exactly interesting, is it?

There is a more subtle issue, however, about the role of language. This concerns consistency. One can express mathematical relationships symbolically. If one has a suitable dictionary for the mathematical notation, then one can represent assumptions, and results entirely in terms of mathematical notation alone. Now, it typically helps for understanding restating those assumptions and results verbally. Sometimes, it is not just a restatement. Sometimes, it is an interpretation in an everyday language. The role of language is therefore to make that interpretation possible.

I want to liken this to some scenes in the 1993 movie “Lost in Translation” by Sofia Coppola. There were quite a few scenes in that movie in which the Japanese dialogue was very long, say over half of a minute, but the translator for Bill Murray would just say something in English for about ten seconds. Well, is that good or bad translation? It is hard to tell---without knowing the context. But if we know the exact context, why would we need translation? Very often, a result in an economics paper requires a very lengthy proof, but the discussion of the results can be quite succinct, even short. The author has glossed over many details. Now is that good or bad? Again it is hard to tell. If we could tell, we would have understood both the mathematics and the verbal description; often we don’t have the time, or don’t want to put in the effort to do so.

**So would you say that language plays a role during the modelling and also at the time of the communication of the findings?**

**How important is notation?**
This is quite a bit of a strange question for me. Although I speak Cantonese and English, I have never thought about economics in Cantonese. I have never spoken about economics in Cantonese either. It would be impossible for me to present an economics seminar in Cantonese. So the question is almost like asking what is it like navigating a terrain like a bat? I have no experience of using a language other than English in economics!

Notation is the ultimate deal breaker. As Shakespeare said, “Brevity is the soul of wit,” I’d say, “Notation is the soul of comprehension.” The usual human short-term memory limitation is about seven items. If I see an equation consisting of five Greek and three Latin alphabets on the left-hand side, and another five or six similar entities on the right-hand side, I’d be lost. I just can’t comprehend so many things. Such cumbersome misfortune, however, originates from an ill-conceived model. Why would one need about sixteen symbols to have some ideas pinned down? That’s usually an indication that there has been some confusion. Clear thinking usually leads to simple notation.

3d. Models are often said to represent a target system (typically a selected part or aspect of the world). Does this characterisation describe what happens in your field? If so, could you say how a model represents its target? In other words, how do you understand the model-world interface?

Models are simplifications. What it really means is that any model must maintain a certain focus---the target. This is true in almost any scientific discourse, and of course in my own research. Recall the three circles that I put up earlier. Sometimes, I’d even make the focus on one single circle, say provider. Then I will have to ignore or heavily simplify the description of the insurer and the consumer. For example, I can assume that the insurer sets a price for a medical service for each provider in the market, and that consumers’ behaviors are described by a demand function. Then I can focus on how a provider reacts to the price and the demand. For example, I studied provider quality and cost-reduction efforts in a paper of mine in 1994. I even extended it to a provider dumping costly patients and cream-skimming profitable patients. The fixed-price assumption for insurer and abstract demand function was very convenient; the analysis did not get too complicated, but the main principles were readily understood.

However, the simplification does ignore some elements that are of interest in a broader context. Obviously, more complex interactions between providers and consumers cannot
be accommodated. More elaborate insurer pricing rules such as risk adjustment, and pay for performance have been set aside.

But this is the way things work in any scientific endeavor. There was first special relativity, and then there was general relativity, more than ten years later. Motion without acceleration was easier to study, but that study was sufficient to change, once and for all, our conception of time and space. Motion with acceleration was more difficult to study, but when it was done, our notion of mass and space was completely changed. I am not familiar with all histories of science, but it seems that scientific models typically begin as simple ones, and then gradually become more complex.

3e. What is the relationship between a model and theory?

A theory means a set of related models. As I just said, we have special relativity and general relativity. Together, they formulate a theory about the macroscopic universe, as we know it.

My three-circle diagram can be thought of as a set of models. I already mentioned the circle on provider. Next, we can consider insurer, and with some simplification on provider and consumer, we have a model about adverse selection in the insurance market. We can even explore advantageous selection, the opposite of adverse selection, in a modified setup.

Finally, we can consider consumer after we simplify the setup for provider and insurer. We then can study how consumers respond to information provided by pharmaceutical companies, or how patients with chronic conditions respond to choices of general and specialty cares.

Now, we can consider two circles together. Give consumers a simplified choice set, such as trusting doctors to decide on treatments, we are off to study how an insurer can influence a physician’s decisions. Can a typical prospective payment contract motivate a physician to choose the right care quality? Or is it a more elaborate partial fee-for-service schedule supplemented by capitation? How does each compare to cost reimbursement? What are the effects on cost efficiency? Alternatively, we can abstract from the insurer and study interactions between physicians and patients. We can study induced demand, compliance, and collusion.

The point is that the basic three-circle diagram embeds in it many model variations. Depending on the focus, some interactions are highlighted, whereas some are suppressed. The grand model, one that consists of how the three parties interact altogether is also
available. Admittedly, such a model tends to be more complex, but it is there. All these models form a theory—an economic theory—of the health market. And I emphasize that this is an economic theory. I can imagine that one can set up these interactions in a framework of medical ethics, sociology, and even political relationships between participants in the health sector. But economists have less convincing expertise about these other aspects!

3f. **What is the aim/use of the model (learning/exploration, optimisation/exploitation)?**

One can be scholarly about the aim of a model or a theory. G. H. Hardy, a British mathematician who, together with J. E. Littlewood, revolutionized modern mathematics, was so proud of his mathematics being utterly useless—in the same sense that a chess game is useless. But economics isn’t mathematics, and most economists will find it odd—if not entirely depressing—if what they do is to be found as useless as a chess game. (I must say that chess games have proven to be so instrumental in our understanding of artificial intelligence, bounded rationality etc., so they are far from being useless. And of course Hardy was also wrong about his mathematics being utterly useless.) But in a scholarly pursuit, one is not to look at immediate usefulness as a goal of developing a theory. In fact, an insistence on usefulness might just turn out to be short sighted.

Perhaps the most complete set of economic theory is the general equilibrium model, which seeks to find conditions for the existence of a competitive equilibrium, and its efficiency property. Kenneth Arrow and Gerard Debreu and many others together did this in the 1940-1950’s. There was elegance to it, a most beautiful model of the market. What was the aim of the general equilibrium model? Finding a set of conditions for the harmonious operation of the free market, or ascertaining the efficiency properties of its equilibria? I am not sure if researchers at the time could have universally agreed on an aim. But scientists and scholars work best when they are free to think and create, so a uniform aim for a model is probably counter-productive. But they did it. My point is that an agreed aim for a model may not be needed. The market of ideas perhaps can sort itself out.

Now a lot of economists, and especially health economists, are interested in developing models to inform and enlighten policies. That’s when things become tricky. Models are supposed to be simplified version of reality. Policy is about the real world, which has so many cofounding elements. Conclusions and recommendations from models may fail to be useful precisely because those models have ignored some significant parts of reality.
If the aim of a model is to inform policy, the model must be relevant. To study health care reform, a model of the insurance market must include the regulations in Obama Care. The researcher has no other alternative. The model, therefore, tends to be less general. It would not apply to another economy, such as the one in Canada, or Sweden. My point is that one has to be practical if the aim is a practical recommendation!

3g. In case you use computer simulations, what is the relationship between simulations and the model?

Well, I don’t do simulations, but can appreciate their power! Simulations are examples, which may eventually lead to insights, or give clues that can be used to formulate general results. But I have very limited experiences, so would not want to venture too far.

3h. What is a good model?

This is a very deep issue. I tend to use a rule that is popularly attributed to Einstein: “A model should be as simple as possible, but not simpler.” The good thing about a simple model is that it has just enough components for a good understanding. The general principle is that if you can use a model that employs two components to explain why fee-for-service pricing tends to raise health care cost, that’s better than a model that employs twelve components! If you can make the point with one provider, why bother with a model with two providers?

However, economic models are not just about being simple and being elegant. Economics is also about relevance. And that may require us to build models in complex and tedious components. Our model may have to incorporate key components of the real world. Sometimes the way to do it is to use an overly simplistic model, derive the results, and then argue that the cofounding factors are not causing serious damage. If you want to inform health care policy, then some complexity must be expected. An overly simplistic model has a serious liability of neglecting too many things.

I think that what qualifies a good model is a practical matter. Our works have different purposes, so they require different kinds of models. It’s too preposterous to aim for a theory of everything. The economics profession is mature enough for an endeavor of many social issues.
(3i) What has been the impact of the development of new technologies or tools? (e.g. in cosmology, telescopes, computer simulations for DNA …)
That’s too speculative for me to contemplate...really that’s beyond my comfort level!

4. How would you define risk? And how does the model help us understand risk?

5. How would you define uncertainty? And how does the model help us understand uncertainty?

I am going to combine these two issues together. First, there has been a lot of study on risk and uncertainty. Decision theorists spend their professional lives tackling the modeling of risk and uncertainty. Game theorists spend their professional lives tackling games of imperfect and incomplete information. Health economists deal with insurance markets in which consumer get sick with unknown likelihoods. The whole information economics literature in the past fifty years is based on risk and uncertainty. There really is no need for me to add to this discussion.

However, I want to use this space to talk about uncertainty in economics. Any scientific discipline has an overarching framework. Particle physicists use their “standard model” to identify fundamental forces and particles. And relativity and quantum mechanics, although not entirely compatible, are widely accepted.

Now if we go back in time to before 1900, then we didn’t have all these fancy theories in physics. Newtonian theory of gravity was the only framework. And if we go backward for another twenty-five years before that, the relationship between electricity and magnetism was just enunciated. Hence, before 1875, nobody would venture to say that electricity and magnetism were one and the same thing.

The point is that scientific advances cannot be easily predicted. Once in a while something significant would happen. In the past hundred years, perhaps the most significant single development in economics happened in 1936, when John Maynard Keynes published “The General Theory of Employment, Interest, and Money.” It was a theory that could not be cast in the neoclassical framework of Marshall, Pigou, and Walras. Indeed, Keynes wrote in the preface of “The General Theory” that his book was meant to be a message to his colleagues at the time. The neoclassical theory of demand and supply with price equilibrating the market, he said, would fail miserably. At that time, the notion that price could not equilibrate the market was so strange. Of course now
we would not be able to imagine what economics would be like if macroeconomics was deleted from the discipline!

Similarly, before the advance of game theory, the standard model of interaction was the competitive or imperfectly competitive market. The notion of an equilibrium used to be defined in each context. The development of game theory introduced an entirely new language and set of tools for analysis. We now have a unified framework to study interactions, between two people, two firms, many people, many firms; single or repeated interactions; with or without uncertainty, etc. Now we can’t imagine how microeconomics would be like without game theory!

Allow me to paraphrase, “There are the known knowns, the known unknowns, and then the unknown unknowns!” (often attributed to a former US Defense Secretary, although the idea of unknown unknown has been known to be used in NASA). What would macroeconomic models look like if we were not to use the current ones? What would microeconomics models look like if we were not to use game theory? The current models of the health sector use basic concepts such as selection, risk adjustment, and moral hazard. It is just impossible to imagine what health economics would be like if we were not to use those concepts.

But if we have learned from our disciplines, we can be sure that there are always new models and new theories. To me, that’s the real uncertainty. When will new models come about? What will they be like?

6. What do you consider to be the work/result in your field which has had the most significant impact on your field? And why?

This is a very difficult question. Health Economics is a big field. Ken Arrow’s paper in the American Economic Review in 1963, “Uncertainty and the Welfare Economics of Medical Care” has often been said to be the first piece in modern health economics. That paper discussed a lot of issues, proposed some solutions, and presented a lot of insights. But what came after in the half century was a huge amount of research. Theoretical, empirical, experimental, policy evaluation, and service discussions are all in the broad portfolio of health economics research. The diversity of research is a very reassuring sign. It means that the field has attained some maturity!
I think that the Handbook of Health Economics, all three big volumes of them, together with other editions of surveys published to date, show the significance of the field, and its impact. Scientific research is very much serious team work! I would be remiss to name only a paper or two.