The Promise and Perils of InsurTech

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Abstract

The insurance sector, in riding the wave of the FinTech phenomenon, has been rapidly expanding, with a slew of firms having emerged to provide so-called 'InsurTech' services. These services incorporate concepts such as blockchain, artificial intelligence, digitalisation, and the sharing economy to various aspects of the insurance industry. This profusion of technology brings with it the promise of various benefits in increasing efficiency and lowering costs for not only insurers and intermediaries, but also businesses or consumers as end-users of insurance. However, the development of InsurTech comes with corresponding risks and regulatory concerns not currently accounted for by the traditional regulatory model. This paper will examine potential risks associated with the application of InsurTech, and scope out how current regulations might hinder (rather than facilitate) the development of InsurTech. This paper then concludes with a discussion of various possible responses or regulatory approaches to InsurTech applications.

I. Introduction

In recent years, the rise of financial technology ("FinTech") has attracted much interest, in part due to the rapid technological developments to the provision of financial services. New technological capabilities augment present and future capacity to address persistent needs, generating various opportunities for the finance industry in terms of, among other things, improving financial inclusion, providing more tailor-made financial services, or filling gaps left behind by existing services. The widespread use of the Internet and smartphones, the construction of ever-faster telecommunication and data networks, and exponential increases in computing power have all contributed to an unprecedented level of technological application in the provision of financial services.[1]

The insurance industry is not immune from the FinTech phenomenon, though it seems to have been affected at a different pace and in a qualitatively different manner from its banking

[1] For the evolution of financial technology, see generally Douglas W. Arner, Jànos Barberis & Ross P. Buckley, "The Evolution of Fintech: A New Post-Crisis Paradigm?" (2016) 47 Georgetown Journal of International Law 1271 at 1276-1305.

counterpart.[2] Insurance technology, a subset of FinTech[3] manifested as InsurTech,[4] has nevertheless permeated every corner of the insurance sector. Observers predict that "there is more room for growth, and therefore disruption, in the insurance sector".[5] Global investment in InsurTech also surged in recent years.[6] The tremendous interest can also reflect the success of individual companies. In 2019, Lemonade, a well-known New York-based InsurTech start-up, secured funding of US$300 million.[7] ZhongAn Insurance, an online-only insurer in China, has attracted 460 million users and underwritten more than 5.8 billion policies since 2013.[8]

The basis of this increased interest is the development of technology which promises heretofore unmatched levels of precision and accuracy in terms of predictive capabilities. For example, the insurance industry is projected to have a huge increase in sensor data (taking the finance industry as a whole, a doubling of the available sensor data in 2017 compared to 2015, and a possible tripling in the next three years) as a result of the installation of billions of sensors "that will be giving off valuable information".[9] When compared with other financial sectors, insurance is projected to have access to the greatest amount of data and it is this phenomenal growth which offers opportunities for "upstarts" to significantly challenge traditional insurance.[10]

In the foreseeable future, the most exciting arena of InsurTech promises to be Asia (more specifically, China and Southeast Asia ("SEA")). Granted, most tech-based insurance ventures have to date been in the US; but China and SEA countries are taking an increasing share of InsurTech deal flow.[11] The rise of Asia in this regard has been attributed to several factors,

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[2] Angelica Wilamowicz, "The Great FinTech Disruption: InsurTech" (2019) 34:2 Banking & Finance Law Review 215 at 220-221 [*Wilamowicz*].
[3] *Wilamowicz*, *supra* note 2 at 215.
[4] Vinnie Lauria, "Free From Legacy Baggage, Asian Insurtech Firms Are Reimagining The Insurance Industry", *Forbes* (20 June 2018), online: <https://www.forbes.com/sites/vinnielauria/2018/06/20/free-from-legacy-baggage-asian-insurtech-firms-are-reimagining-the-insurance-industry/#199fb37472af> (InsurTech' refers to the application of a variety of technologies in the fields of insurance to cut costs and enhance processes; InsurTech could involve the use of blockchain, artificial intelligence, the Internet of Things, social network or other new technological ideas); PricewaterhouseCoopers, "Top insurance industry issues in 2016 – InsurTech" (2016) at 2, online: <http://www.pwc.com/us/en/insurance/ publications/top-insurance-industry-issues-insurtech.html> (InsurTech has been seen as the "insurance-specific branch of FinTech").
[5] *Ibid* at 221.
[6] See below Part II.A.
[7] Oliver Ralph, "InsurTech start-up Lemonade raises $300m", *Financial Times* (11 April 2019), online: <https://www.ft.com/content/051c7858-5bdb-11e9-9dde-7aedca0a081a>.
[8] William Pritchett et al., "Insurtech 10: Trends for 2019" (2019), *KPMG*, at 11, online: <https://home.kpmg/xx/en/home/insights/2019/02/insurtech-10-trends-for-2019-fs.html>.
[9] Paul Schulte & Gavin Liu, "FinTech Is Merging with IoT and AI to Challenge Banks: How Entrenched Interests Can Prepare' (2018) 20:3 The Journal of Alternative Investments 41 at 45.
[10] *Ibid* at 46.
[11] Lauria, *supra* note 4.

including the relatively higher e-commerce penetration in China and SEA and the fact that people in China and SEA are not "locked into" traditional insurance products sold by traditional firms.[12] Most importantly, many customers in China and SEA simply cannot afford "gold-plated insurance" due to more moderate incomes and are more willing to adopt cheaper options.

Unsurprisingly, there has been an increasing uptake of technology by insurance companies,[13] due in part to market competition[14] but also because such technology promises substantive benefits which may include: (1) more precise measurements of underlying insurance risk with big data; (2) improving insurers' investment activities through the use of algorithms, artificial intelligence ("AI") or other new methods; and (3) offering insurers greater protection against operational risks, such as prevention of insurance fraud or money laundering, among other things. With increased market competition stimulating innovation, InsurTech also benefits customers by: (1) presenting them with a wider range of tailor-made products and services; and (2) making it more convenient for consumers to access insurance products or streamlining certain processes (e.g. claim processing). Needless to say, the rise of InsurTech has had and will continue to have a massive impact on the insurance sector and could even revolutionise the operation of insurance companies and the function of the insurance market.

However, the introduction of new technology means there will certainly be corresponding issues to resolve. The wide scope of application of InsurTech[15] makes it challenging to view it as a homogenous industry with a single solution. Instead, a holistic approach is required to tackle potential problems arising from InsurTech, drawing from experiences in other fields where technology meets finance.

There is a noticeable lack of in-depth analyses of InsurTech from a legal and regulatory perspective other than discussing the transformational capabilities of InsurTech innovations.[16]

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[12] Lauria, *supra* note 4.
[13] Ng Jun Sen, "Insurers to partner local tech firms to develop new insurance technologies", *The Straits Times* (25 September 2018), online: <https://www.straitstimes.com/business/insurers-to-partner-local-tech-firms-to-develop-new-insurance-technologies> (for example major Singaporean insurance companies are teaming up with local tech companies to develop digital products such as chatbots and phone apps).
[14] João Bueno et al., "Digital Insurance in 2018: Driving real impact with digital analytics" (December 2018), *McKinsey & Company*, at 57-58, online: <https://www.mckinsey.com/~/media/McKinsey/Industries/Financial%20Services/Our%20Insights/Digital%20insurance%20in%202018%20Driving%20real%20impact%20with%20digital%20and%20analytics/Digital-insurance-in-2018.ashx>.
[15] Lauria, *supra* note 4.
[16] Relevant literature include: Tanguy Catlin et al., "Insurtech – the Threat That Inspires" (March 2017), online: <https://www.mckinsey.com/industries/financial-services/our-insights/insurtech-the-threat-that-inspires>.; Pritchett, *supra* note

Questions such as how regulators should respond to the rise of InsurTech have not been addressed. This article attempts to fill this gap in the literature by exploring the benefits and, more importantly, the key risks of and problems with developing InsurTech, as well as examining potential regulatory solutions. This analysis will be of great assistance to jurisdictions that are reviewing their regulatory frameworks to facilitate the development of their nascent InsurTech sectors. It concludes by exploring and favouring the position that regulators should eschew a parochial or hard-line attitude (ie, completely uniform standards) and generally adopt a flexible, principles-based approach to facilitate the beneficial use of InsurTech, while monitoring potential new issues such as technology risk and data accuracy, etc. within the existing regulatory framework.

This article is structured as follows: Part II details the rapid pace at which investment in InsurTech has been growing, the many useful applications of technology in the insurance sector and the overall benefits brought to different market players; Part III enumerates the main risks associated with and problems faced in developing InsurTech; Part IV discusses Singapore's experience in facilitating InsurTech and proposes future regulatory reforms to spur its development; Finally, Part V concludes.

II. The Promises of InsurTech

Traditional insurance companies are operated according to certain key features. First, insurers sign many insurance contracts with customers, allowing insurers to pool risk from various insureds in return for a cash premium. In doing so, insurers can provide insurance coverage for a range of customers who may be exposed to varying degrees of risk, although to some extent low-risk customers subsidise high-risk ones.[17] Second, they will have to actively manage assets (comprising, among other things, collected premiums) to generate more income and to ensure that

9; Bueno, *supra* note 14; Wilamowicz, *supra* note 2; Emanuel Stoeckli, Christian Dremel & Falk Uebernickel, "Exploring Characteristics and Transformational Capabilities of InsurTech Innovations to Understand Insurance Value Creation in a Digital World" (2018) 28:3 Electronic Markets 287 at 293, 295-307 [*Stoeckli*]; Thomas Puschmann, "Fintech" (2017) 59:1 Business & Information Systems Engineering 69; Zavolokina et al., "FinTech – What's in a Name?" (2016) In: Thirty-Seventh International Conference on Information Systems, Dublin, Ireland; James Platt, Joaquin Pedruelo and Kshitij Nangia. "Can Data and Technology Make the Insurance Industry Relevant Again?" (2019) 74 Boletin de Estudios Economics 5;
Liz McFall and Liz Moor. "Who, or what, is insurtech personalizing?: persons, prices and the historical classifications of risk" (2018) 19:2 Distinktion J Soc Theory 193.

[17] Randy E. Drumm, David L. Eckles & Martin Halek, "An Examination of Adverse Selection in the Public Provision of Insurance" (2013) 38:2 The Geneva Risk and Insurance Review 127 at 137-139; Hajime Miyazaki, "The Rat Race and Internal Labor Markets" (1977) 8:2 The Bell Journal of Economics 394; Michael Spence, "Product Differentiation and Performance in Insurance Markets" (1978) 10 Journal of Public Economics 427 at 440; Francis Cheng, "Time to review risk pooling in health insurance", *The Straits Times* (5 December 2015), online: < https://www.straitstimes.com/forum/letters-in-print/time-to-review-risk-pooling-in-health-insurance>;

they can pay customers when risk is realised. Thus, insurers are generally exposed to a variety of risk factors, including the underlying insurance risk, investment risk and concentration risk.[18] Third, retail or business customers are generally limited to off-the-shelf policies offered by insurance companies, with the exception of bespoke insurance policies bargained individually (at a price) with a broker or insurer. Examples of such bespoke policies are insurance (or reinsurance) policies negotiated on the Lloyd's market. The arrival of InsurTech may revamp the insurance market to the benefit of market participants and end-users.

A. The Rise of InsurTech in the Capital Market

InsurTech has been a growing force around the world, as evidenced by increasing InsurTech investment funding from 2011 to 2018 (with investment funding peaking in 2016).[19] With InsurTech entering its "second wave", it is anticipated that investment funding will be more strategic, although no less vigorous.[20] InsurTech is both mature enough to experience a fair degree of mergers and acquisitions ("M&A"), but also young enough that massive sums of venture capital ("VC") are still flowing into multiple new start-ups looking to tackle different niches in the vast insurance sector. Even as venture capitalists allocate larger sums to invest in rapidly growing InsurTech providers, incumbent insurance companies are also joining the scramble to acquire or support companies that are developing and integrating new technologies. The result has been a dramatic growth in investments: over $28 billion was raised by InsurTech companies over the last three years, in 665 deals, as depicted in Figure 1 below.

Figure 1: Global Private Investment (VC, PE and M&A) in InsurTech (2010-2018)[21]

[18] These three categories correspond broadly to the risk factors identified in regulations: see Insurance (Valuation and Capital) Regulations 2004 (No S 498/2004) sch 2.
[19] Deloitte, "InsurTech entering its second wave: Investment focus shifting from new startups to more established innovators" (2018) at 5, online: <https://www2.deloitte.com/content/dam/Deloitte/us/Documents/financial-services/us-dcfs-insurtech-entering-second-wave.pdf>.
[20] *Ibid* at 6.
[21] Source: Ian Pollari, "The Pulse of Fintech 2018" (2019), *KPMG*, at 20, online: <https://assets.kpmg/content/dam/kpmg/xx/pdf/2019/02/the-pulse-of-fintech-2018.pdf> [*KPMG*]; Ian Pollari, "The Pulse of Fintech Q4 2017" (2018) *KPMG* at 19, online: <https://assets.kpmg/content/dam/kpmg/cl/pdf/2018-02-kpmg-chile-advisory-fintech-pulse.pdf>.

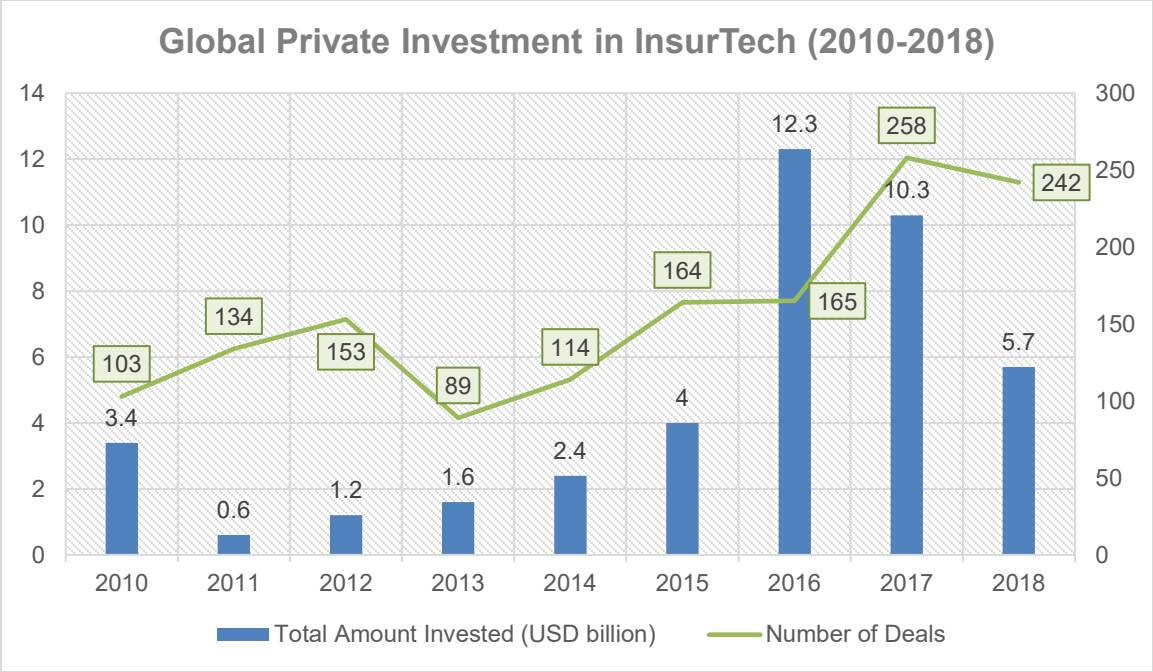
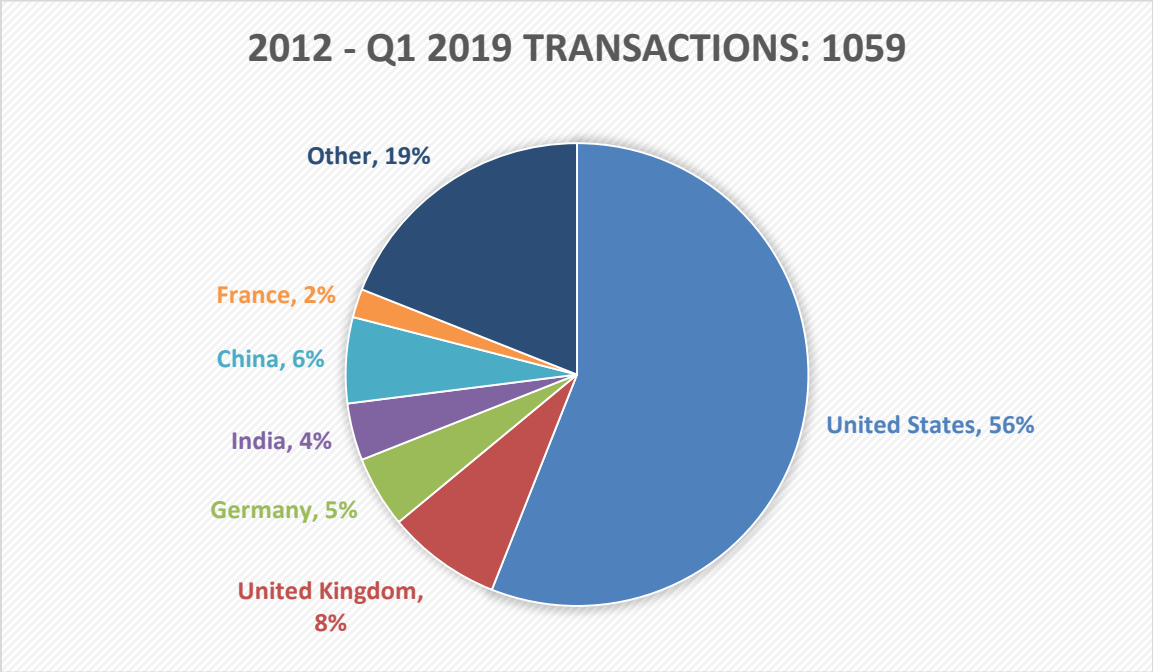


Figure 2: InsurTech Transactions by Target Country (2012-Q1 2019)[22]



While there is data that supports a global levelling of InsurTech investment, the industry is still dominated by the US, as shown in Figure 2, above. The US has been responsible for 56% of all insurance tech deals in the period spanning 2012 to the present. The UK, Germany, and France are the top three InsurTech markets in Europe, each receiving 8%, 5%, and 2% respectively over the same period.[23]

Despite the US dominance, Europe and Asia-Pacific are gradually increasing in prominence. China, as well as financial hubs such as Hong Kong, Singapore and other cities in India are emerging.[24] Such growth is to be expected because of the accelerated adoption of new technologies, high levels of investment in digital transformation, swift expansion of domestic enterprises, extensive development of infrastructure, and, most crucially, the rapid growth of the

[22] Source: Monia Ben Nejima, "M&As and exits analysis in InsurTech [part 2]" (2017), *Mind the Bridge*, online: <https://mindthebridge.com/mas-exits-analysis-insurtech-part2/> [*Nejima*]; Andrew Johnston, 'Quarterly InsurTech Briefing Q1 2019' (2019) *WillisTowers Watson*, at 26 online: <https://www.willistowerswatson.com/en-SG/insights/2019/05/quarterly-insurtech-briefing-q1-2019> [*Johnston*].
[23] *Nejima*, *supra* note 22.
[24] Fintechnews Singapore, "Asia: 100 Insurtech companies and counting", *FinTech News Singapore* (29 August 2018), online: <http://fintechnews.sg/23449/insurtech/asia-100-insurtech-companies/> (Singapore is Asia's largest InsurTech hub in terms of start-up count, followed by the Indian cities of Mumbai and Gurgaon).

middle class and gross domestic product in the region. Indeed, in Q1 2019, 54% of all InsurTech deals took place outside of the US. This matches a trend set over the last two years in which an increasing amount of InsurTech activity is taking place outside of the US.[25]

In sum, the rise of InsurTech cannot be ignored. We have seen not only a substantial amount of money injecting into InsurTech companies, but also a considerable number of M&A deals in the industry over the past few years. While the US still leads the market, recent developments in China and SEA suggests that InsurTech may play a more prominent role in those regions.

B. Promising Applications of Technology in the Insurance Sector

InsurTech may find application throughout the life cycle of an insurance product, from product development, underwriting and distribution of platforms to administration and claims processing.[26] The application of InsurTech can be divided according to the steps of the insurance cycle and how technology is currently leveraged to the benefit of insurers and customers in each step.

First, InsurTech features heavily in the pre-contractual stage. InsurTech may help to provide client-facing solutions such as "digital service provisioning".[27] This may take various forms such as a digital service assisting customers in finding the best or cheapest insurance products available to them (e.g. Insurify or CXA Group[28]).[29] Other InsurTech firms help customers to better manage their portfolio of insurance policies and provide integrated services ranging from finding a suitable insurance product to claims and insurance management (e.g. Inzsure[30]). Insurance products may also be distributed digitally (e.g. through direct online sales) with better digital infrastructure (e.g. using online self-service portals or chatbots).[31] Those often include the combination of technologies such as artificial intelligence, machine learning, Big Data and the Internet of Things.

[25] *Johnston*, *supra* note 22 at 23
[26] *Wilamowicz*, *supra* note 2 at 226.
[27] *Stoeckli*, *supra* note 16 at 293 and 295 to 207.
[28] CXA, homepage < https://www.cxagroup.com/about/overview >.
[29] Schulte and Liu, *supra* n 9 at 53.
[30] Inzsure, homepage < https://www.inzsure.com/ >.
[31] *Stoeckli*, *supra* note 16 at 293 and 297.

Second, InsurTech firms may also improve product development. A prime example is flight delay insurance products which are embedded with smart contracts, allowing automated payment that is trigged by information extracted from the Internet regarding flight delays (e.g. Etherisc[32]). There are also new usage-based insurance providers offering *ad hoc* temporary insurance which provides coverage only when the customer is actually using the insured property (e.g. Cuvva offering car and travel insurance over flexible time periods[33]). This may lower overall insurance costs and have insurance plans to be better tailored to the needs of the customers.[34]

Third, in the post-contractual stage, InsurTech can make claims processes smoother and more convenient, reducing the costs associated with filing insurance claims.[35] This can be achieved by having a platform linking insured persons, vehicle workshops and insurers (e.g. Snapsheet[36]), assisting disaster-related claims inspections (e.g. Spex[37]) or linking patients to doctors and insurers (e.g. Sherpaa[38]). These services aim to provide a better experience for customers for which smoother claims processes are a key objective, given that claims settlement is expected to become one of the most important elements of customer engagement.[39]

Fourth, InsurTech may also assist back-office operations of an insurer for underwriting, risk management or regulatory compliance. InsurTech may help insurers to assess a customer's risk profile in a more precise manner via better-calibrated data analytics tools and/or through more comprehensive analyses of Big Data, instead of relying on simple proxies (e.g. gender or age). For example, traditional risk profiling methods usually result in young men having to pay higher premiums for motor insurance than women of the same age group as it is presumed that men are likely to drive more recklessly.[40] The availability of personalised information may therefore do

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[32] Etherisc, homepage <https://etherisc.com/>.
[33] Cuvva, homepage <https://www.cuvva.com/>.
[34] Financial Stability Board, *Artificial intelligence and machine learning in financial services* (2017), at 31.
[35] Financial Stability Board, *supra* note 34 at 14.
[36] Snapsheet, homepage < https://www.snapsheetclaims.com/ >.
[37] Spex, homepage < https://insur-tech.com/Startup/spex/ >.
[38] Sherpaa, homepage < https://sherpaa.com/ >.
[39] *KPMG*, *supra* note 21 at 5.
[40] Lynn Tan, "Women are safer drivers and pay less insurance", *The Straits Times* (1 September 2018), online: < https://www.straitstimes.com/lifestyle/motoring/women-are-safer-drivers-and-pay-less-insurance> [*Lynn Tan*]; other kinds of insurance are gender-differentiated as well: see AIA, "4 Factors That Will Determine The Cost Of Your Insurance Premiums" online: <https://www.aia.com.sg/en/life-matters/planning-for-the-future/insurance-premiums-what-determines-the-cost.html>; See also *Association Bedge des Consommateurs Test-Achats ASBL v Conseil des Ministres*, C-236/09, [2011] ECR I-00773 at [30]-[34] online: <http://curia.europa.eu/juris/celex.jsf?celex=62009CJ0236&lang1=en&type=TXT&ancre> (case overturned the practice of charging differential premiums on grounds of gender) [*Association*].

away with the need to paint all members of a class with the same broad brush. It should also improve the quality of underwriting.

Fifth, InsurTech could improve risk control or loss assessment to reduce moral hazard[41] after the issuance of a policy. It is a crucial value-add to operations of an insurance company or an insurance intermediary. For example, some InsurTech firms have developed tools to identify the risk certain drivers pose to fleet safety (e.g. Acculix[42]) or utilised a smart phone's telematics to track a customer's driving habits (e.g. YouToggle[43]). More precise risk assessment translates into better decision-making as insurers can more accurately balance the factors which must be considered when deciding whether to underwrite risk. In the same vein, InsurTech may facilitate the loss adjustment process by ensuring better customer care during the claims stage. It is not uncommon for life insurers to leverage on technology products to encourage certain healthy habits (e.g. to walk a certain number of steps a day)[44] that help improve the client's health and well-being and, accordingly reduce the insured risk. Technology may also help insurance companies to conduct know-your-customer ("KYC") checks, detect fraud, and facilitate compliance with anti-money laundering guidelines. Specifically, blockchain technology has been used to counter insurance fraud, improve identity management, track the provenance and ownership of properties and assets, and enable the sharing of fraud intelligence among institutions.[45] Moreover, technology may also help insurers to make better investment decisions (e.g. through AI and data analytics[46]).

Based on the applications of InsurTech, we have some general observations. Firstly, market players adopting InsurTech solutions are not limited to technology firms and start-ups. Encouraged by the market to engage in digital transformation,[47] incumbent insurers have adapted and adopted technology, where appropriate,[48] for various purposes ranging from promoting new products to risk assessment and control (e.g. deploying devices to track an insured's driving habits[49]). There

[41] Theo Lynn et al., eds, *Disrupting Finance: FinTech and Strategy in the 21st Century* (Switzerland: Palgrave Macmillan, 2019), ch 5 at 73-81; Financial Stability Board, *supra* note 34 at 31.
[42] Acculix, homepage < https://acculux.eu/data-privacy/ >.
[43] YouToggle, homepage <https://www.youtoggle.com/>
[44] In the US: https://smallbusiness.yahoo.com/advisor/post/107429003017/img-width-310-height-185
In Singapore: https://www.straitstimes.com/singapore/health/every-step-counts-for-vitality-members
[45] Indranil Nath, "Fight insurance fraud: data sharing with blockchain technology' (2016) *IBM Corporation* at 4-6, online: <https://www.ibm.com/downloads/cas/VRRRPQGZ>.
[46] Chris Wood, "AI and climate change transform investment sector", *Financial Times* (15 September 2019), online: <https://www.ft.com/content/fa8885f6-ad69-3dd0-a437-6aeb23c753ad>.
[47] Nath, *supra* note 45 at 4.
[48] *KPMG*, *supra* note 21 at 5.
[49] *Ibid* at 17.

are many start-ups offering innovative forms of insurance protection (e.g. Oscar[50] or Lemonade[51]) or providing brokerage or auxiliary services (e.g. searching for cheapest quotes) to insurers, reinsurers or customers.[52]

Moreover, non-financial firms are also venturing into the insurance sphere. For example, Grab, the largest ride-hailing platform in SEA, intends to provide personal accident insurance to over 25 million drivers in the region via its app.[53] Grab has also ventured into providing health insurance for drivers through a micro-insurance scheme. [54] Go Jek, the Indonesian ride-hailing company, launched "Go-Sure", an online travel insurance service, in partnership with PasarPolis, an InsurTech start-up.[55] Other novel applications are also available. For example, there has also been insurance covering surge pricing in the case of rain. [56] Incumbent insurers may also collaborate with technology firms. For example, China's ZhongAn International is a joint venture between Ping An Insurance (the largest insurer in China), Alibaba (the Chinese e-commerce giant) and Softbank (a Japanese tech firm).[57] Some collaborations see insurance companies providing insurance services for certain products sold by a technology or services firms (e.g. AIG and Apple's AppleCare+[58]).

Secondly, the application of InsurTech seems to be concentrated in the following three categories of insurance: property and casualty ("P&C"), health, and life insurance. [59] P&C insurance may broadly include motor insurance and travel insurance, where the application of technology has been pervasive. Regarding life and health insurance, the complexity of these

[50] Homepage < https://www.hioscar.com/ >.
[51] Homepage < https://www.lemonade.com/ >
[52] Oscar Insurance, online: <https://www.hioscar.com/>; Hugh Terry, "Oscar Health – The Health Insurance Startup That Wants To Revolutionise Healthcare" (accessed 2019), online: < https://www.the-digital-insurer.com/dia/oscar-health-health-insurance-startup-wants-revolutionise-healthcare/>; Lemonade, online: < https://www.lemonade.com/>; Hugh Terry, "Online Peer-to-Peer Insurer" (accessed 2019), online: < https://www.the-digital-insurer.com/dia/lemonade-online-peer-peer-insurer/>.
[53] Aw Cheng Wei, "Grab rolls out credit services and loans as part of Asean fintech push", *The Straits Times* (20 March 2019), online: <https://www.straitstimes.com/business/grab-rolls-out-credit-services-and-loans-as-part-of-asean-fintech-push>.
[54] Grab, online: <https://www.grab.com/sg/press/others/grab-and-ntuc-income-launch-southeast-asias-first-micro-insurance-for-critical-illness-protection-exclusively-for-grab-driver-partners/>; Tessa Oh, "Grab drivers to pay as little as 10 cents for critical illness coverage under new micro-insurance plan", *Today* (1 August 2019), online: <https://www.todayonline.com/singapore/grab-drivers-pay-little-10-cents-critical-illness-coverage-under-new-micro-insurance-plan>.
[55] Khamila Mulia, "Go-Jek to offer digital insurance services through Go-Sure", *KrAsia* (17 July 2019), online: < https://kr-asia.com/go-jek-to-offer-digital-insurance-services-through-go-sure-service>.
[56] Channel News Asia, online: <https://www.channelnewsasia.com/news/technology/grab-insurance-plan-surge-pricing-rainy-days-ntuc-income-10859580>.
[57] Jon Russell, "SoftBank's Vision Fund to help Chinese online insurance giant ZhongAn go international", *TechCrunch* (20 August 2018), online: < https://techcrunch.com/2018/08/20/softbank-vision-fund-zhongan/>.
[58] Apple, online: <https://www.apple.com/uk/legal/sales-support/applecare/applecareplus/docs/applecareplus_uk_tc.html> (in the UK, the AppleCare+ is backed by an insurance policy issued by AIG).
[59] Catlin et al., *supra* note 16 at 3-4.

products has prompted the development of many services or platforms to assist firms, individuals and brokers to find best-fit plans or manage healthcare benefits. The overall trend seems to be shifting towards a more diverse range of insurance products, especially in emerging and developing economies.[60] It remains to be seen how far InsurTech may venture into other areas (e.g. marine insurance or other commercial insurance).

Finally, InsurTech applications may be analysed according to the various business models adopted by market players, each of which may target different user bases. For example, China's InsurTech giant ZhongAn targets consumers directly, focusing particularly on the younger generation of Chinese. In comparison, the leading InsurTech start-up in Singapore, CXA Group, is a brokerage which targets companies rather than individuals, providing them with a platform to give employees access to a range of health and wellness offerings. Other InsurTech companies may do both, such as PasarPolis, a major InsurTech start-up in Indonesia which offers policies directly to consumers and through business-to-business partnerships.

In summary, InsurTech has a wide range of applications. It may adapt and apply cutting-edge technologies, enhancing the industry's hardware (e.g. cloud computing) or software (e.g. better analytical methods) infrastructure for various purposes (e.g. new products or more precise risk assessment and control). InsurTech also brings benefits to customers, such as by offering more choices or tailor-made products. Market competition and diversity, combined with the availability of more precise risk assessment tools, may also help customers to more easily find suitable products. Moreover, customers could benefit from lower premiums should the application of technology help to identify them as belonging in a low-risk group. This may bring costs down for those customers and improve overall efficiency[61] as well as increase financial inclusion. For example, high levels of mobile penetration and the use of mobile payment services has facilitated the growth of micro-insurance in emerging economies with the number of policies issued by mobile insurers jumping from a total of over 30 million policies in 2015 to over 61 million in 2017.[62]

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[60] UNSGSA Fintech Working Group & CCAF, "Early Lessons on Regulatory Innovations to Enable Inclusive FinTech: Innovation Offices, Regulatory Sandboxes, and RegTech" (2019) at 14, online: <https://www.unsgsa.org/files/2915/5016/4448/Early_Lessons_on_Regulatory_Innovations_to_Enable_Inclusive_FinTech.pdf> accessed 25 June 2019>.

[61] UNSGSA Fintech Working Group & CCAF, *supra* note 60 at 10.

[62] UNSGSA Fintech Working Group & CCAF, *supra* note 60 at 13-14.

III. The Risks and Problems of InsurTech

Despite these potential benefits, InsurTech is not free from risks. Some of these risks are common issues from the general use of technology, such as cyber security and personal data protection. Some risks are more specific to the application in the insurance industry. The following sections will re-group potential risks into categories and link different risks to different uses of technology in the sector.

A. Prejudice and Discrimination in Applying Data

The establishment and differentiation of an individual risk profile is an inherent feature of the insurance business model. Even with comprehensive questions in proposal forms and an insured's duty of disclosure of material facts in law,[63] insurers are still faced with many unknown factors that materially affect the insured's risk profile. Another method is to classify customers based on certain traits (e.g. gender or age) to approximate risks associated with these unknown factors. The inability to precisely identify and measure all relevant risk factors, and the use of somewhat arbitrary classifications in determining risk, results in some low-risk customers subsidising other groups of customers. For example, when motor insurance premiums are largely based on gender and age, it is possible that young but prudent male drivers would have to pay higher premiums, if the insurer assumes, based on general perception (or perhaps on statistical analysis), that young males are more likely to cause traffic accidents. Naturally, such differentiation of customers might lead to accusations of discrimination and arguments for fair treatment.[64] Some jurisdictions restrict the use of certain information as underwriting factors to address concerns about discrimination. For example, the European Court of Justice has prohibited insurers from differentiating premiums for motor insurance based on gender.[65]

InsurTech is likely to make these worries more prominent as it allows customers to be profiled using a much greater array of factors that may potentially undermine fairness and create discriminatory effects.[66] For example, the question of whether it would be fair for an insurer to use

[63] Marine Insurance Act (Cap 289) ss 18-20.
[64] Benjamin Cheatham, Kia Javanmardian & Hamid Samandari, "Confronting the risks of artificial intelligence", *McKinsey Quarterly* (April 2019) at 3, online: <https://www.mckinsey.com/business-functions/mckinsey-analytics/our-insights/confronting-the-risks-of-artificial-intelligence>.
[65] *Association*, *supra* note 43.
[66] Benno Keller, "Big Data and Insurance: Implications for Innovation, Competition and Privacy" (March 2018) *The Geneva Association* at 11, online: < https://www.genevaassociation.org/sites/default/files/research-topics-document-type/pdf_public/big_data_and_insurance_-_implications_for_innovation_competition_and_privacy.pdf> [*Keller*]

personal data from social media or social networks to evaluate a customer's risk profile does not admit of any easy answer.

Such prejudice may manifest as higher insurance costs. Although InsurTech may, in theory, make insurance cheaper for those who are classified as low-risk, the opposite may also be true. It is possible that some people in the high-risk group may be excluded from acquiring insurance protection due to high risk or higher premiums.[67] The impact on underwriting practices, prudential requirements of insurers and the broader issue of financial inclusion should be subject to further studies.

The question of how the industry should deal with this potential prejudicial effect must be subject to further scrutiny by the public. On the one hand, it is a choice of values that should invite different approaches in different markets. For example, it is still common to use age and gender as simple benchmarks to decide motor insurance premiums in some markets.[68] On the other hand, governments should consider the important social role of insurance as a risk management tool if discrimination could have a significant impact on financial inclusion and the quality of risk pooling. The degree of potential problems also depends on the healthcare system in a country. For example, it might be less an issue in a country where government provides fundamental healthcare (e.g. UK),[69] but it may be an important issue in a country where people have to buy health insurance for medical care (e.g. US).[70] These concerns should warrant a careful study of the full range of all potential consequences.

In addition, even if we could identify variables that may have discriminatory effects, how to regulate or restrict their use will remain a practical issue. Simply eliminating discriminatory variables such as gender and race from collected data does not do away with potentially disparate treatment, as an algorithm could infer these features from other factors ('blatant proxies')[71]. For

[67] Financial Stability Board, *supra* note 34 at 31-32.
[68] *Lynn Tan*, *supra* note 40.
[69] In the UK, the fundamental healthcare system is operated by the National Health Services (NHS), funded by the Ministry of Health. See generally Josh Chang et al., "The UK Health Care System", online: < http://assets.ce.columbia.edu/pdf/actu/actu-uk.pdf>.
[70] "Premiums and Pulses: Navigating the US Healthcare System", *BBC*, online: < http://www.bbc.com/storyworks/specials/moving-to-america/navigating-the-us-health-system.html?cid=PPG0043237&SearchEngine=GOOGLE&Keyword=%2Bus+%2Bhealthcare&MatchType=b&AdID=43700045660701069&gclid=Cj0KCQjwzozsBRCNARIsAEM9kBPwl1VQNSJ36Q_0JjC9pot5DKfChOBkPi2iMRbwSEZs4fi1XpcuxzYaAh1yEALw_wcB&gclsrc=aw.ds>.
[71] See Nizan Packin and Yafit Lev-Aretz, "Learning Algorithms and Discrimination" in Research Handbook on the Law of Artificial Intelligence (Barfield and Pagallo ed., Edward Elgar) at 96.

example, the ubiquity of online media greatly facilitates inference of an individual's gender, ethnicity, nationality, sexual orientation or other personal information.[72] In the era of Big Data, regulators should eschew the binary decision of either banning or allowing some use of data; rather, a more holistic approach should be adopted in regulating or restricting the use of data in the insurance sector.

A prime example of regulation in this area are laws pertaining to the proper use of genetic information by insurers. For example, the Genetic Information Non-discrimination Act of 2008[73] in the US generally prohibits insurers from using genetic data for health care insurance.[74] In Singapore, while there was no law introduced to reach the same effect, insurers nevertheless undertook a self-imposed prohibition on the use of genetic testing as a screening process for life or health insurance applications.[75] The responses of other countries may range from industrial self-regulation to legal limitations or legal prohibitions on the use of genetic information.[76]

It is out of the scope of the article to make a definitive argument on what amounts to a discriminatory use of Big Data. Whether and how the use of non-genetic data by insurers should be regulated is a concern that society as a whole should debate, and not one that should be left solely to the discretion of regulators.

B. Accuracy of Data and Analytics for Artificial Intelligence

Data has always been the lifeblood of the insurance business, and the digital age has made it more important and relevant to insurers than ever. InsurTech start-ups and incumbent insurers interested in deploying AI need access to huge amounts of data to 'train' the AI for its intended functions (e.g. risk assessments or fraud detection). There are risks that both market participants and regulators should not ignore, as people start to grapple with the potential consequences of relying on AI to make important decisions.

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[72] *Keller*, *supra* note 66 at 12
[73] Pub L 110-233.
[74] Final Rules Prohibiting Discrimination Based on Genetic Information in Health Insurance Coverage and Group Insurance, 45 CFR Parts 144, 146 and 148 (74 Federal Register 51663 *et seq*.)
[75] Life Insurance Association Singapore, "Genetics and Life Insurance – A position paper by the Life Insurance Association, Singapore" [2006] at [6.3], online: <https://www.bioethics-singapore.org/files/publications/others/genetics-and-life-insurance.pdf>.
[76] Swiss Re, "Seeing the Future? How Genetic Testing Will Impact Life Insurance" (2013), at 8-10, online: <https://www.swissre.com/dam/jcr:2bccf1e2-eaa5-4ca2-a416-f6dedcebe9dc/Genetics_Seeing_the_future.pdf>.

First, the accuracy of data should always be a concern. Any bias in the data could affect the validity of a model, algorithm and outcome and, hence, the outputs of a trained system. Data biases may come from sampling, measurement and algorithm risks.[77] This can have direct consequences on insurers and their customers. For example, an incorrect analysis of a customer's risk profile may cause an insurer to wrongfully grant or reject an insurance application, resulting either in unwanted risk or lost business. If an algorithm wrongly treats a customer's claim as fraudulent, it may result in customer complaints and raise conduct of business issues (e.g. unreasonably rejecting a claim[78]). Machine learning may amplify some elements of model risk to exacerbate these issues.[79]

Additional issues may arise when insurance decisions are automated. In computer science, different approaches have been developed to assess and correct for the disparate impact of automated decision-making. All such approaches, however, may share the common disadvantage of reduced accuracy in risk classification. Inaccurate risk classification may not only be perceived as unfair, but also has broader implications for efficiency and welfare by reducing the role of premiums as a signal of risk. It is therefore necessary to strike a difficult balance between the speed of risk assessments and the potential disparate impact on different social groups. Insurers will have to test and assess algorithms for potential disparate impact.[80]

Second, data dependence comes at a price. Data presents many opportunities for InsurTech companies, but an ever-growing reliance on data means they must also manage a new form of risk: data veracity. Inaccurate, biased, or manipulated information threatens to compromise the accuracy of insights used by insurance companies to plan, operate and grow their businesses. Eighty percent of the insurance executives surveyed by Accenture in 2018 reported that their organisations increasingly use data to drive critical and automated decision-making at scale.[81] However, a recent study estimated that 97 percent of business decisions are made using data that the companies' own managers consider to be of unacceptable quality.[82]

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[77] Bernhard Babel et al., "Derisking Machine Learning and Artificial Intelligence", *McKinsey & Co* (February 2019), at 4, online: <https://www.mckinsey.com/business-functions/risk/our-insights/derisking-machine-learning-and-artificial-intelligence>.
[78] E.g. Financial Conduct Authority, Insurance Conduct of Business, 8.1.1R.
[79] Babel et al., *supra* note 77 at 2.
[80] *Ibid* at 12
[81] Carrie Lonze, "The New Risk Confronting Digital Insurers: Bad Data", *Accenture* (17 December 2018), online: <https://insuranceblog.accenture.com/the-new-risk-confronting-digital-insurers-bad-data> [*Lonze*].
[82] *Lonze*, *supra* note 81.

InsurTech start-ups and incumbent insurers will need to do more to ensure the veracity of the data they use, focusing on three data-focused tenets:[83] (1) provenance – verifying the history of data from its origin throughout its life cycle; (2) context – considering the circumstances around its use; and (3) integrity – securing and maintaining data. To establish these principles throughout their businesses, they should build a 'data intelligence' function, drawing from existing data science and cybersecurity capabilities to grade the accuracy of the data they use. Insurers will also need to be able to track how the data is recorded, used and maintained. [84] Regularly monitoring and maintaining data streams to ensure accuracy will be essential. Therefore, it is vital for insurance companies to work together with platform providers to understand the source of previously used data and conduct forensic assessments of the quality of the company's own data. To this effect, InsurTech companies should consider implementing strong audit and transparency provisions to ensure the traceability and accountability of data use and learnings.[85]

C. Cybersecurity and Data Protection

The increasing ubiquity of InsurTech raises serious concerns about cybersecurity and data privacy issues. No other industry has suffered data breaches to the extent occurring in the insurance industry.[86] This problem presents challenges to developing countries.[87] This danger has been most clearly recognised in a report commissioned by a few insurance and reinsurance companies, which suggested that a coordinated global cyber-attack, spread through malicious email (the hypothetical scenario developed as a stress test for risk management), could result in insurance claims between US$10 billion and US$27 billion globally.[88]

Given its increasing reliance on complex information technology (IT) systems and operations, the insurance sector has to prepare for a heightened risk of cyber-attacks and system

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[83] *Ibid*.
[84] *Ibid*.
[85] Nicholas Boyle et al., "Technology and disruption in the insurance sector", *DLA Piper* (21 May 2019), online: <https://www.dlapiper.com/en/uk/insights/publications/2019/05/technology-and-disruption-in-the-insurance-sector/>.
[86] Americas FS Regulatory Centre of Excellence, "Key regulatory challenges", *KPMG* (2017), at 8, online: <https://assets.kpmg/content/dam/kpmg/us/pdf/2017/04/facing-the-insurance-industry-in-2017.pdf>.
[87] Inutu Lukonga, "Fintech, Inclusive Growth and Cyber Risks: Focus on the MENAP and CCA Regions" (September 2018) International Monetary Fund Working Paper No WP/18/201 at 21, online: <https://www.imf.org/en/Publications/WP/Issues/2018/09/11/Fintech-Inclusive-Growth-and-Cyber-Risks-Focus-on-the-MENAP-and-CCA-Regions-46190>.
[88] Bengaluru (Reuters), "Potential global cyber attack could cause $115b-$261b worth of damage, says report", *The Straits Times* (29 January 2019), online: <https://www.straitstimes.com/world/potential-global-cyber-attack-could-cause-115b-261b-worth-of-damage-says-report>; see also Noor Zainab Hussain, "Lloyd's to Require Cyber Cover Clarity in Re/Insurance Policies", *Insurance Journal* (8 July 2019), online: <https://www.insurancejournal.com/news/international/2019/07/08/531405.htm>.

disruptions. In this regard, insurers and InsurTech companies will have to deepen their technology risk management capabilities and be ready to handle IT security incidents and system failures. As part of a growing recognition of the risk posed by cyber-attacks, Lloyd's of London, the prominent insurance and reinsurance marketplace, has, in a bid to improve clarity on cyber insurance, called for *all* insurance and reinsurance policies to clearly state whether coverage will be provided for losses caused by a cyber-attack.[89] In Singapore, regulation in the form of the Monetary Authority of Singapore's ("MAS") Technology Risk Management guidelines seek to ensure insurance companies have a minimum standard of readiness to combat cyber threats and attacks. The MAS also recommends technology risk management requirements for strengthening system, network and infrastructure security, and articulates procedures for system development and security testing.[90] The MAS has also published notices for insurer and insurance brokers on "Technology Risk Management".[91]

It is also important to note that a portion of the Big Data being gathered by insurers or InsurTech companies may constitute 'personal data' under data protection legislation in Singapore.[92] Accordingly, they must pay careful attention to the source and methods of data collection and be transparent about the ways in which such data will be used. For one, InsurTech companies will have to obtain the consent of the respective individuals before they can collect and use the personal data of potential customers.[93] A firm should notify a customer of the purposes of collecting personal data.[94] As per the relevant data protection legislation, specific personal data protection policies will have to be implemented,[95] and a data protection officer will have to be appointed.[96] Keeping data secure is a difficult and time-consuming task, even when the data is kept on company servers or on internal databases. As a result, InsurTech providers may have difficulty meeting the robust data security requirements expected of them. Whatever the specific

[89] Noor Zainab Hussain, "Lloyd's of London calls for cyber cover clarity in insurance policies", *Reuters* (4 July 2019), online: <https://www.reuters.com/article/us-cyber-insurance-lloyds-of-london-idUSKCN1TZ19J?utm_campaign=trueAnthem:+Trending+Content&utm_content=5d1e0b3b0ca7240001ca8671&utm_medium=trueAnthem&utm_source=twitter>.
[90] MAS, Technology Risk, 17 January 2019, online: <http://www.mas.gov.sg/Regulations-and-Financial-Stability/Regulatory-and-Supervisory-Framework/Risk-Management/Technology-Risk.aspx>.
[91] MAS Notice on Technology Risk Management, MAS Notice 127 (issued on 21 June 2013); and MAS Notice on Technology Risk Management, MAS Notice 506 (issued on 21 June 2013).
[92] Personal Data Protection Act 2012 (No. 26 of 2012), s 2.
[93] Personal Data Protection Act 2012 (No. 26 of 2012), s 13.
[94] Personal Data Protection Act 2012 (No. 26 of 2012), ss 18-20.
[95] Personal Data Protection Act 2012 (No. 26 of 2012), s 12.
[96] Personal Data Protection Act 2012 (No. 26 of 2012), s11(3).

details of their delivery models, providers will have to emphasise compliance with core security standards and ensure the prompt notification and remediation of breaches.[97]

The discussion above focuses on issues pertaining to the collection of Big Data. Insurers themselves are also a key source of Big Data. For example, a large life insurer would have a tremendous amount of data on the health- or income-related information of customers (e.g. probability of getting breast cancer). Thus, the methods by which insurers use their own data or the extent to which they should be allowed to share such information with other third-party service providers (e.g. sharing insurance information with a medical facility) is likely to become a difficult, if not controversial, problem.

In order to acquire consent from customers, insurers often draft contractual clauses permitting insurance companies to disclose customer data. For example, a major Singaporean insurer's Privacy Policy states that the insurer is permitted to collect personal data for various purposes, including for the purposes of providing "financial advice and product recommendation" or promoting "complementary products or services to [the customer] from business partners with whom [the insurer] have formed an association".[98] Furthermore, the insurer may also be permitted to disclose a customer's personal data to "business partners and affiliated companies".[99] In addition, the application form includes a declaration that a customer agrees to the privacy or personal data statement of the insurer, to the effect that when a customer signs the application form, he/she virtually agrees to the various ways which the insurers could use or share his/her personal data.

The use of customers' data by insurance companies in a manner not directly linked to the provision of insurance services might potentially trigger financial regulatory concerns. The question is whether an insurer should be allowed to promote a new product to an existing customer based on his/her insurance records. This may raise concerns of mis-selling and fair treatment of customers. Customers' consent in boilerplate form does not answer the vexed question of whether regulators should intervene to prevent insurers or intermediaries from deriving benefits from an excessively broad standardised personal data statement. Regulators should balance the benefits

[97] Boyle et al., *supra* note 85.
[98] NTUC, online: <https://www.income.com.sg/privacy-policy>.
[99] *Ibid*.

such standardised forms accord to insurers against the potential detriment to customers in deciding whether boilerplate forms should be legally valid.

Furthermore, it is more problematic when an insurer sells or charges a fee for using insurance data which it has collected or compiled. Although this article does not venture into data protection or privacy laws, it bears mentioning that salient regulatory concerns are raised given the sheer amount of personal and sensitive data involved. Again, regulators may be called upon to balance the benefits accorded to insurers by allowing them to sell data (which may provide a new source of revenue for some insurers) as well as other benefits to the industry as a whole to facilitate more information sharing (e.g. giving start-up having access to more data to devise better solutions) against the corresponding detriment to customers.

D. Fraud and Misconduct

Even in the 21st century, insurance fraud is still rampant in the market. In the US, estimates suggest that fraudulent insurance claims for jewellery alone costs insurers US$2 billion a year.[100] There are many methods by which fraud may be perpetrated in the insurance markets; for example, cybercriminals may use stolen identities to obtain new policies or conduct account takeovers, and then proceed to make false claims or change payee information to receive claim funds. Addressing fraud risk is therefore key to the online business models of InsurTech providers, given that they rely on digitising functions to reduce costs. The advanced use of technology may, to some extent, reduce the occurrence of fraudulent claims. For example, greater data availability and improved data analytics may augment the capability of insurers to detect fraud. Technological development is a double-edged sword, however, and fraudsters may themselves find new technology-enabled ways of committing insurance fraud.

So far there is no clear reported scandal on how fraudsters may use new technology to defraud. If insurance payments (e.g. premiums or payment of claims) are made electronically, the MAS has issued the E-Payments User Protection Guidelines to address cybersecurity risk and protecting users of electronic payments from fraud, errors and security threats. Under the guidelines, financial institutions, such as insurance providers, are expected to provide notifications to their customers for all e-payment transactions. These notifications allow customers to monitor

[100] Andrew W. Singer, "Can Blockchain Improve Insurance?" (2019) 66 Risk Management 20 at 24.

their e-payment transactions, and report unauthorised transactions promptly to their insurance providers. The providers must investigate such claims quickly and provide a detailed investigation report within 21 days for straightforward cases, and 45 for complex ones.[101] Nevertheless, for other potential frauds (e.g. fraudulent claims), there is no clear regulatory response in Singapore at the moment.

Apart from specific regulatory responses, insurers may turn to cyber security policies to protect themselves against losses arising from cyber risk (e.g. mass hacking). However, there is a danger that a single cyber security event might concurrently affect many people, triggering a landslide of losses.[102] Whether direct and reinsurance companies are able to digest immediate or sudden losses of large magnitudes remain to be seen.[103]

E. Regulatory Challenges

An unfavourable regulatory environment can be a significant barrier to entry for InsurTech newcomers and onerous regulatory requirements may lead to a slow, uphill and capital-intensive burnout for these start-ups.[104] In Singapore, companies seeking to venture into the business of selling, issuing, originating or underwriting insurance policies must first obtain the applicable licences under the Insurance Act.[105] Further, if advice is rendered as part of the service provided, a financial advisory licence may need to be obtained,[106] though a licensed insurer or intermediary might be exempt from the licensing requirement as an "exempt financial adviser".[107]

These licensing requirements may present obstacles to InsurTech start-ups. The threshold question is whether a new product or service is a kind of "insurance". If a firm's business is not related to "insurance", it is usually not captured by insurance regulations. It is worth noting that the scope of insurance regulations could be wider than traditional "contract of insurance".[108] For example, under Singapore law, a firm selling certain financial guarantees or performance bonds

[101] MAS, Update to E-Payments User Protection Guidelines, 25 April 2019.
[102] *Supra* note 88.
[103] "The market for cyber-insurance is growing", *The Economist* (26 January 2019), online: <https://www.economist.com/finance-and-economics/2019/01/26/the-market-for-cyber-insurance-is-growing>.
[104] Interview with CEO of CXS, 17 May 2019, Singapore
[105] Insurance Act (Cap 142, Revised Edition 2002) [*Insurance Act*], s 3.
[106] Financial Advisers Act (Cap 110, Revised Edition 2007) [*Financial Advisers Act*], s 6.
[107] Financial Advisers Act, s 23(1).
[108] The classic definition of a "contract of insurance" was given by Channell J in *Prudential Insurance Co v Inland Revenue Commission* [1904] 2 KB 658 at 664.

may still be deemed as an insurance business.[109] If a firm falls within the regulatory scope but fails to apply for a licence, the firm may be subject to criminal penalties for conducting an illegal insurance business,[110] and may be mandatorily dissolved, subject to the regulator's discretion.[111]

If such licenses are not readily obtainable, entrepreneurs will be forced to acquire an existing company with the relevant licenses, potentially making costs very high depending on market conditions.[112] The transfer of ownership of an existing insurance company is also subject to regulatory approval and control,[113] making such transactions more complex than a straight-forward share purchase and takeover. Even becoming a substantial shareholder of an existing insurer requires prior regulatory approval.[114]

Even after a licence is acquired, compliance with other relevant regulations remains a costly continuous process. These regulations may include solvency and capital adequacy regulations, and corporate governance, conduct of business or anti-money laundering requirements.[115] Unsurprisingly, these ongoing compliance costs might deter new InsurTech propositions. Indeed, tight regulations, high capital barriers, and difficulties in obtaining a license to operate have been identified as the main challenges facing new entrants in the insurance sector.[116]

The introduction of InsurTech start-ups with novel business models may also pose a challenge to regulators. So far, it has been relatively straightforward to decide whether a new service is a kind of insurance. For example, there is little doubt that a product offering automated payments due to flight delay is a kind of insurance as a firm promises to make payments due to a future unforeseen and adverse event. Moving forward, however, there could be new products challenging the definition of 'insurance'. The regulatory consequences associated with whether a

[109] Insurance Act, s 2(1)(b).
[110] Insurance Act, s 3(2).
[111] See for example *Digital Satellite Warranty Cover Ltd v Financial Services Authority* [2013] UKSC 7.
[112] Interview with CEO of CXS, 17 May 2019, Singapore.
[113] E.g. Insurance Act s 28.
[114] E.g. Insurance Act s 29.
[115] E.g. Insurance (Valuation and Capital) Regulations 2004; Notice on Prevention of Money Laundering and Countering the Finance of Terrorism – Life Insurers (Notice 31); Insurance (Corporate Governance) Regulations 2013; Notice on Market Conduct Standards for Direct Life Insurer as a Product Provider (Notice 318).
[116] Sabine Vander Linden, *The InsurTech Book* (John Wiley & Sons, 2018) at 104; Jamie Smith, "An assessment of the Australian insurtech ecosystem" (2018) EY at 24, online: < https://www.ey.com/Publication/vwLUAssets/ey-and-insurtech-australia-ecosystem-report-2018/$FILE/ey-and-insurtech-australia-ecosystem-report-2018.pdf> [*Smith*].

service is insurance is very substantial. The attitude of the financial regulator then would have significant implications on the development of the market in the future.

Another internal issue which InsurTech start-ups could face would be difficulties in attracting qualified and suitable local talent, an issue which is particularly acute in a small country like Singapore. More experienced IT experts may not view being involved in an InsurTech start-up as a viable alternative to the traditional career path, with people being hesitant to step foot into this industry.[117] While younger IT professionals may be more willing to step into this industry, they may, however, be less skilled and experienced. Nevertheless, start-ups may have no choice but to hire such personnel given the high overall cost of hiring talented workers.[118] Other than Singapore, this labour shortage is felt particularly seriously in countries where the InsurTech ecosystems are still very young, such as in Australia, where the average age of InsurTech is three years.[119] In these circumstances, InsurTech start-ups tend to have to resort to hiring foreign programmers.

IV. The Way Forward in Facilitating InsurTech

Given the promises and potential risks associated with InsurTech, the ultimate question is how regulators should respond. It is not an easy task to design and maintain a regulatory framework which not only allows new InsurTech firms a chance to shine without being overburdened by regulatory costs, but also effectively pre-empts and contains potential hazards and problems. It is difficult to provide a definitive answer in an ever evolving and dynamic insurance market amidst the advancement of technology. Instead, this article takes the general stance that regulators should adopt a flexible approach, while seeking to curtail potential problems where necessary. In doing so, this article examines several practical ways in which this approach has been applied from the perspective of financial regulations in Singapore.

A. Promoting Innovation

This article argues that regulators should adopt a more liberal attitude toward the rise of InsurTech. The International Association of Insurance Supervisors also noted that regulators "also

[117] Lin Lin, "Venture Capital in Singapore: The Way Forward" (2019) 5 *Journal of Business Law* 363, at 386. Lin Lin, "Regulating FinTech: The Case of Singapore" *Banking and Finance Law Review* (2019), forthcoming.
[118] Interview with CEO of CXA, 17 May 2019, Singapore.
[119] *Smith*, *supra* note 116 at 9

need to … consider how to create the proper environment to foster innovation".[120] The efficacy of this approach is evident from China's rapid development into a fast-growing, dynamic InsurTech market.[121] An accommodative regulatory environment enabled China to build a solid foundation for InsurTech, and jurisdictions looking to support its development should similarly encourage experimentation by entrepreneurs on a national basis. The approach of Singapore's financial regulatory authority, the MAS, towards InsurTech serves as an excellent case study to illustrate this point.

The MAS has taken a gradually warming attitude towards InsurTech, and more generally, FinTech. This evinces a recognition by the MAS of InsurTech's potential to redefine traditional business models. Consequently, it has been continuously and actively promulgating policies to promote digital innovation in a bid to welcome local, regional and international InsurTech companies to enter Singapore's market. As a result, and in accordance with global trends, there has been a notable increase in the presence of InsurTech start-ups based in Singapore. This is expected to continue, stimulated in part by the MAS' various policy initiatives.

First, the MAS established the FinTech Regulatory Sandbox ("Sandbox") under the FinTech Regulatory Sandbox Guidelines,[122] to allow innovators to experiment with their ideas for a fixed duration in a controlled environment where certain regulatory requirements are relaxed on a case-by-case basis.[123] Upon successful experimentation in the Sandbox, new start-ups "graduate" and will then need to comply with the full set of regulations. The Sandbox reduces the regulatory obstacles to innovation by allowing insurers, intermediaries, and InsurTech developers to develop their innovations and beta test them, allowing these innovations to flourish under regulatory supervision. Indeed, the usefulness of the sandbox is evidenced by the fact that regulatory sandboxes are being launched around the world to encourage test-and-fail situations, such as Malaysia's Financial Technology Regulatory Sandbox introduced in 2016 and Japan's Fintech Proof of Concept Hub established in 2017.

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[120] International Association of Insurance Supervisors, *FinTech Developments in the Insurance Industry* (2017) at [17].
[121] KPMG, "InsurTech: Infrastructure for New Insurance" (19 July 2019), online: < https://home.kpmg/cn/en/home/insights/2018/10/insurance-technology.html>.
[122] MAS, "FinTech Regulatory Sandbox Guidelines", 16 November 2016.
[123] MAS, FinTech Regulatory Sandbox, online: <http://www.mas.gov.sg/Singapore-Financial-Centre/Smart-Financial-Centre/FinTech-Regulatory-Sandbox.aspx>

However, there is some uncertainty as to whether these sandboxes are sufficient to promote InsurTech. It is worth nothing that, by the end of 2018, three of the six sandboxes awarded by the MAS were in the insurance sector: PolicyPal (an app-based platform to help users to find insurance), Inzsure (a digital platform based on blockchain technology selling insurance to corporate customers) and MetLife Innovation Centre.[124] Thus, in Singapore at least, the insurance sector seems to be one of the main beneficiaries of the sandbox regime. This may be contrasted with data from the UK, where the number of sandboxes licenses awarded by the Financial Conduct Authority (FCA) to the insurance sector were far less than those in the banking and capital market sector.[125] By the end of 2018, only 13 out of 87 sandboxes awarded were related to insurance services.[126] Thus, the insurance sector is better represented in the regulatory sandbox regime in Singapore as compared to the UK. However, this may merely be a function of the fact that very few firms have gone through the Sandbox regime in Singapore, resulting in a disproportionate representation of the insurance sector.

Arguably, sandboxes could allow regulators to gain a better understanding of InsurTech, who might then enlist this understanding to develop improved laws and regulations which do not hinder its early development.[127] The primary approach here should still be for regulators to institute facilitative regulations in the first place, and then use the feedback pertaining to the utility and propriety of current policies collected from the sandbox to revise such regulations or to calibrate certain policies where appropriate.

In addition, the MAS has issued the Sandbox Express in August 2019, to complement the existing Sandbox.[128] The Sandbox has been well-received by FinTech companies, with more than 150 FinTech players engaging with the MAS since its launch in 2016. However, a key issue dissuading participation is the extensive approval process, which requires FinTech companies to expend substantial valuable time and effort. The Sandbox Express aims to streamline this

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[124] *Supra* note 123.
[125] Christopher Chen, "Regulatory Sandbox in the UK and Singapore: A Preliminary Survey", at 13-14, online: <https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3448901>.
[126] *Ibid*.
[127] Dirk A. Zetzsche et al., "Regulating a Revolution: From Regulatory Sandboxes to Smart Regulation" (2018) 23 Fordham Journal of Corporate and Financial Law 31 at 79; ESMA, EBA & EIOPA, "Fintech: Regulatory sandboxes and innovation hubs" (2018) at 16, retrieved from https://www.esma.europa.eu/sites/default/files/library/jc_2018_74_joint_report_on_regulatory_sandboxes_and_innovation_hubs.pdf.
[128] Lin Lin, "Regulating FinTech: The Case of Singapore" *Banking and Finance Law Review* (2019), forthcoming.

process,[129] and would fast-track innovation by enabling certain categories of firms to embark on experiments more quickly without needing to go through the ordinary process of obtaining permission to participate in the Sandbox. Thus, the Sandbox Express may result in more companies utilising the Sandbox, which may allow for a larger and more representative sample to be analysed when assessing the success of Singapore's Sandbox initiative.

The Sandbox Express is suitable for activities where the risks are generally low or well understood, and could be reasonably contained within a specific pre-defined sandbox. Thus, as a start, it will include sandboxes specifically predefined for insurance broking, recognised market operators, and remittance businesses. An applicant will have to declare that it is able to fully comply with all pre-determined requirements of the sandbox applied for, providing clear disclosure and obtaining an acknowledgement from the user before the user can be on-boarded as a customer. Approval decisions will be granted within 21 days, with this streamlined process[130] serving to speed up the introduction of new and innovative InsurTech services to the market.[131] Practitioners anticipate that this programme will lead to new insurance brokers graduating from the Sandbox on an expedited path and emerging on the market in 2019.[132]

Singapore has also been extending greater support to FinTech start-ups through various grants designed for FinTech companies at different developmental stages, and for foreigners and local natural people who may be interested in picking up the skills necessary to enter the industry or foreign and local companies.[133] For example, the Startup SG Tech grant set up by the government aims to boost the progress of start-ups developing technology solutions. It has been recently revised to provide successful applicants with greater ease of cash flow. While the previous arrangement required start-ups to first incur expenditure which would be reimbursed by the grant,

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[129] MAS, "Consultation Paper on Sandbox Express" (14 November 2018) Monetary Authority of Singapore Consultation Paper No P015-2018 at 4.
[130] MAS, online: <https://www.mas.gov.sg/news/media-releases/2019/mas-launches-sandbox-express-for-faster-market-testing-of-innovative-financial-services>.
[131] *Ibid*; MAS, "MAS Proposes New Regulatory Sandbox with Fast-Track Approvals", *Monetary Authority of Singapore* (14 November 2018), online: < https://www.mas.gov.sg/news/media-releases/2018/mas-proposes-new-regulatory-sandbox-with-fasttrack-approvals>.
[132] Ian Stewart, "Digital Insurance Broking Will Take Off In Singapore In 2019", *Mondaq* (6 December 2018), online: <http://www.mondaq.com/x/761470/fin+tech/Digital+Insurance+Broking+Will+Take+Off+In+Singapore+In+2019>.
[133] MAS, Setting up Your FinTech Business in Singapore, online: <http://www.mas.gov.sg/Singapore-Financial-Centre/Smart-Financial-Centre/Setting-up-your-Business.aspx>. See also , Lin Lin, "Regulating FinTech: The Case of Singapore" *Banking and Finance Law Review* (2019), forthcoming.

the new arrangement, which applies from 1 August 2017 onwards, will disburse grant monies upon the completion of specified milestones instead.[134]

Additionally, Enterprise Singapore, a government agency promoting entrepreneurship, runs an annual competition for start-ups around the world called SLINGSHOT 2019, with over S$ 1 million worth of prizes to be won. Start-ups can compete in numerous categories, with one category being FinTech and InsurTech.[135] The grand winner will be awarded a S$ 200,000 Startup SG grant and 18-month free access to a workspace catered specially to start-ups for 18 months rent-free, with another 12 sector winners receiving a S$ 50,000 grant and 6-month free access to a workspace catered specially to start-ups for 18 months rent-free.

The MAS' changing attitude towards InsurTech is also evident from the establishment of a new FinTech & Innovation Group ("FTIG") within its organisational structure in August 2015, aimed at creating a conducive environment for FinTech innovation. The whole of FTIG consists of a diverse range of talents, including technicians, legal consultants, start-up experts and business consultants, to cater to its different responsibilities.[136] Specifically, FTIG is responsible for "regulatory policies and development strategies to facilitate the use of technology and innovation"[137] in the financial landscape. The FTIF comprises three offices: the Payments & Technology Solutions Office, the Technology Infrastructure Office, and the Technology Infrastructure Office.[138]

MAS has also adopted a flexible and efficient approach in addressing inquiries, where questions can come in through various channels such as MAS' public queries hotline and email, the FinTech Office, Sandbox mailboxes and other departments in and outside of MAS, and still be promptly addressed. FTIG officers engaging with the FinTech companies work closely with other departments within MAS, and also other government agencies, to formulate responses to queries

[134] Enterprise Singapore, Startup SG Tech, 4 April 2019.
[135] Enterprise SG, "SLINGSHOT powered by Startup SG returns for the third year with more opportunities for global investors, corporates and startups to match up", *Enterprise Singapore* (28 April 2019), online: <https://www.enterprisesg.gov.sg/media-centre/media-releases/2019/april/slingshot-returns-for-the-third-year-with-more-opportunities-for-global-investors-corporates-and-startups-to-match-up>.
[136] Interview with officials from FTIG and Data Analytics Group, 7 October 2018.
[137] MAS, "MAS sets up new FinTech & Innovation Group", *Monetary Authority of Singapore* (27 July 2015), online: <http://www.mas.gov.sg/news-and-publications/media-releases/2015/mas-sets-up-new-fintech-and-innovation-group.aspx>.
[138] *Ibid*.

from the companies.[139] MAS (and the Singapore government) adopts a "no wrong-door policy",[140] requiring the officer receiving the query to ensure that the enquirer is provided a response within the stipulated timeline (usually seven working days).[141]

Finally, MAS maintains a practice of consistently issuing consultation papers to gather industry feedback before implementing regulatory solutions in response to key regulatory issues, such as the implementation of the Sandbox.[142] Apart from official consultations, MAS has also played a significant role in constantly engaging industry players so as to create a conducive FinTech environment. FTIG's various initiatives, including events such as the Singapore FinTech Festival, the Global FinTech Hackcelerator,[143] FinTech Deal Day, ASEAN Financial Innovation Network (AFIN),[144] and FinTech Directory[145] have already attracted a variety of companies, industry figures and talents to congregate in Singapore, establishing an active environment of FinTech innovation and generating considerable publicity of Singapore's support for technology. For example, the Singapore FinTech Festival, which is the world's largest annual FinTech festival, provided a discussion platform for over 40,000 participants and key stakeholders in the year 2018 alone.[146] Through such events, MAS is able to constantly keep abreast of relevant issues and industry perspectives. What the MAS has done may be worthy of consideration by other countries seeking to promote the growth of InsurTech.

B. Lowering Regulatory Risk and Compliance Costs

As discussed above, insurance regulation entails legal risk and compliance costs that might hinder the development of InsurTech. This article argues that the objective is thus to reduce regulatory and compliance costs without compromising regulatory goals through the use of

[139] *Ibid*.
[140] The "No Wrong Door" policy was introduced in 2004 as a means for the Public Service in Singapore to deal with misdirected feedback or cross-agency issues from the public effectively.
[141] Email interview with MAS officers in charge of FTIG, 24 August 2018.
[142] MAS, "Consultation Paper on FinTech Regulatory Sandbox Guidelines" (6 June 2016) Monetary Authority of Singapore Consultation Paper P005-2016.
[143] The Global FinTech Hackcelerator is an opportunity for the industry to submit their problem statements to be solved by the Fintechs (i.e. matching demand with supply) in a 12-week experiment.
[144] Fintechnews Singapore, "ASEAN Financial Innovation Network: An Industry Fintech Sandbox to Drive Innovation and Inclusion", *FinTech News Singapore* (17 November 2017), online: <http://fintechnews.sg/14574/fintech/asean-financial-innovation-network-support-financial-services-innovation-inclusion/>.
[145] Together with the Singapore FinTech Association, MAS has also published the FinTech Directory, which is a free-to-use listing of FinTechs in Singapore.
[146] Highlights of the Singapore Fintech Festival 2018, (November 19, 2018) online: < http://fintechnews.sg/26301/events/highlights-of-the-singapore-fintech-festival-2018/ >.

targeted regulation. The International Association of Insurance Supervisors also agrees that regulators "need to balance the risks of new innovation against the benefits for policyholders and the insurance sector as a whole",[147] and "policymakers will need to evaluate and where appropriate adjust their regulatory framework from a prudential and conduct of business perspectives to adequate address changed risks and business models."[148]

This approach properly recognises the potential benefits InsurTech could bring without turning a blind eye to the risks that it introduces. The previous section examined the "regulatory sandbox" initiative in promoting innovation in InsurTech. This initiative is (at present) structured as a temporary measure rather than a long-term solution, and does not meet the need for a comprehensive and nuanced regulatory framework to facilitate the development of InsurTech. Thus, in the long run, a re-examination of regulatory approaches to InsurTech may be necessary. This section provides some suggestions in light of the promises and perils of InsurTech that have been detailed so far.

As a starting point, we can distinguish firms that provide essential insurance-related services (e.g. underwriting risk or insurance brokerage) from firms that provide auxiliary services (e.g. firms providing data analytics for KYC purposes). Regulations have mainly targeted the former type of firm. However, as regulatory frameworks develop, the question arises as to whether the financial regulator should directly regulate the latter type.

Direct regulation has often been criticised for imposing high administrative and compliance burdens on regulated persons, and for stifling innovation and entrepreneurialism.[149] Regulators may adopt an alternative approach known as 'meta-regulation' when dealing with InsurTech firms that do not directly provide insurance services. This involves regulators delegating the risk control function to corporations and overseeing their risk management systems rather than carrying out regulation directly.[150]

Under the 'meta-regulation' approach, regulated firms would write a set of rules tailored to the specific context of the firm. In turn, these rules would be subject to scrutiny and approval

[147] International Association of Insurance Supervisors, *supra* note 120 at [17].
[148] *Ibid*.
[149] Eric Windholz, *Governing Through Regulation* (EBSCO Publishing, 2017) at 160
[150] Julia Black, "Paradoxes and Failures: 'New Governance' Techniques and the Financial Crisis" (2012) 75:6 Modern Law Review 1037 at 1045-46. [*Black*]

by a regulatory agency, such as the MAS. In other words, regulators do not directly regulate those firms, but apply a lighter touch approach, by, for example, requiring an insurer or brokerage firm to establish contractual and internal control mechanisms for use when dealing with third-party technology providers. Even in the case of an insurer developing a new tool to improve services or operations (e.g. by using AI to improve claims settlement), regulators do not necessarily have to apply a hands-on approach to regulate incumbent instruments. This approach relegates the regulator to the role of auditing, monitoring, and incentivising these systems.[151] This is also the stance taken by Singapore's financial regulator regarding digital advisory services.[152]

The potential advantages of this are numerous. First, the meta-regulation approach offers greater flexibility by allowing firms to design systems and process that would be more efficient.[153] This approach allows InsurTech companies the freedom and incentive to tailor a set of rules that are best suited for their mode of operating, while still ensuring compliance with regulatory aims.[154]

Second, non-uniform standards would likely produce better results than across-the-board rules, which may unduly restrict some InsurTech firms, yet be too lax in the case of others. This is especially so given the fact that InsurTech is a blanket term encompassing the use of a variety of technologies in a multitude of insurance fields. Firm-specific rules and processes would arguably be more precise than industry-wide rules, which tend to either be so complex as to require a significant expenditure of resources to ensure compliance or too vague because such rules attempt to account for a variety of possible contexts. Furthermore, new rules would also be more easily implemented in a system with non-uniform standards, since it would not be necessary to await industry-wide agreement.[155]

Third, corporate insiders would more likely possess specialised knowledge of the technology or business models adopted by the firm than external inspectors, and, consequently, are also better placed to detect infringements than regulators. The more flexible meta-regulatory regime should be more likely to help managers to innovate and improve controls than under rules dictated to them by regulators.[156] As a suggestion, regulators could encourage compliance by

[151] Robert Baldwin & Martin Lodge, *Understanding Regulation* (Oxford Scholarship, 2011) at 147 [*Baldwin*]
[152] MAS, Guidelines on Provision of Digital Advisory Services (CMG-G02), at [15].
[153] *Black*, *supra* note 150 at 1045.
[154] *Baldwin*, *supra* note 151 at 147.
[155] *Ibid* at 148.
[156] *Ibid* at 149.

instituting an incentive system which rewards devising and implementing good risk management systems. For instance, high-performing and compliant InsurTech start-ups could be publicly recognised through certification grants or inclusion.[157] With regard to the regulation of licensed insurers or brokerage firms, regulators should continue to review existing regulations. For example, there could be different regulatory models for different types of insurers, in addition to the long-existing distinction between general and life insurers, so as to reap more benefits through a more differentiated treatment of insurance providers.

This article recognises that meta regulation and principled-based regulations are not short of problems.[158] Non-uniform standards may also increase monitoring costs given that different firms might be exposed to different standards. Effective regulation may also depend on the capacity of the regulator to supervise internal systems proposed by a variety of financial firms and enforce rules where necessary. However, this article believes that, in light of the potential benefits of InsurTech and the number of market participants in place, benefits derived from the inherent flexibility of the meta-regulatory system and removing the burden of regulatory design from the regulator outweigh the potential increase in supervisory and enforcement costs.

In short, this article does not propose to have a complete overhaul of insurance regulations simply for the sake of promoting InsurTech. Recognizing that there are common regulatory concerns (e.g. insolvency of an insurer or misselling of insurance products), what we propose is to embrace greater diversification in regulatory models to meet the requirements of and risks posed by different types of insurance service providers. To promote the use of InsurTech, regulators should not adopt a hard-line approach, but should instead rely on meta-regulation; this balances the need to facilitate the testing of new technology against the need to have certain prescribed methods of controlling risks. The approach should also allow regulators some room to learn from and analyse feedback, as well as to adapt to the application of new and evolving technology.

In other words, regulators could consider adopting the approach underlying the regulatory sandbox – that is, tailor-made regulatory requirements – in fashioning a long-term regulatory model. In the long run, this approach might be able to accommodate the different innovations and technological applications of InsurTech by incumbents and new technology firms. A further

[157] *Ibid* at 151.
[158] See generally *Black*, *supra* note 150 at 1042-48.

advantage of the greater diversification in regulatory approaches should allow regulators more opportunities to learn from and adapt to the market. In this sense, a shift towards a principles-based regulatory approach should be more welcome than a strictly rules-based approach.

C. Other General Suggestions

In light of the potential perils brought by the application of technology in the insurance sphere, the following general points may be made. First, the importance of technology risk management (TRM) and outsourcing risk is paramount, given that incumbent insurers and new InsurTech start-ups might not have the requisite technology or necessary equipment (e.g. cloud computing servers) in-house to manage technological risks (such as system failure or cyber attacks). The traditional focus of regulation has been on the maintenance and recovery of "critical systems" of an insurer, which are meant to kick in only after incidents have occurred (e.g. hacking),[159] or implementing a system for reporting incidents to apprise the regulator of any relevant incident.[160] In light of the increasing importance of cybersecurity and data protection to InsurTech firms, regulators should place more emphasis on a pre-emptive approach to data security and cyber risk in formulating regulations.

Second, regulators cannot continue to turn a blind eye to potentially discriminatory effects arising from the application of certain technologies based on Big Data analytics, AI and algorithms. It is beyond the scope of this article to examine the fairness of using social media to judge a person or whether discrimination based on some variables (such as genetic information) should be prohibited or continue to be banned. Those issues must be subject to a far more in-depth study than is possible here. This article generally suggests that the views of the public should shape policy on the issue. This will require greater public participation, which regulators must facilitate. Government policy will then incorporate public feedback into a sound and actionable system of checks and balances.

Finally, talent shortages in fast-growing tech sectors such as data analytics, programming, AI and cybersecurity are shackling the growth plans of InsurTech companies. This trend will only be exacerbated by more restrictive immigration policies. Singapore's recent tightening of hiring guidelines is instructive: in 2017, the country experienced the largest ever drop in the number of

[159] MAS Notice 127, para 6.
[160] MAS Notice 127, paras 7-8.

working foreigners in 15 years. This was a decline of 32,000 foreigners in 2017, ten times more than the decline of 2,500 experienced in 2016.[161] According to India's business daily, NDTV, local IT industry body NASSCOM observed that the number of Indian professionals in Singapore's tech sector shrunk to under 10,000 with work visas not being renewed upon expiry.[162]

Furthermore, approval requirements for foreign Employment Pass applications are being made stricter so as to induce employers to consider Singaporeans for job vacancies ahead of foreigners. Starting from 1 July 2018, companies with 10 or more full-time employees seeking to hire foreign employees on Employment Passes must first advertise the positions at the National Jobs Bank portal for at least 14 days should the fixed monthly salary for the position be below S$15,000. Relative to the previous requirements, this is an increase from a minimum salary of S$12,000 and a decrease from the minimum employee size of 25, with the practical effect of increasing the number of companies subject to this requirement.[163] To address this issue, Singapore government has recently launched a pilot scheme to help tech start-ups in applying employment passes for their foreign talent under more flexible requirements.[164] Accommodating the mobility of foreign talent through simple and flexible immigration policies and programmes will allow regulators to further promote the sector and ensure that the right skills are available.[165]

In line with previous recommendations, having carve-outs or exemptions from what is currently a uniform policy may ultimately be beneficial for a country's insurance and InsuTech sector.

V. Conclusion

InsurTech has its limitations, with customers possibly still preferring face-to-face insurance transactions and retaining the human touch which claimants may require. However,

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[161] Joanna Seow, "Biggest drop in foreigners working in Singapore in 15 years: Manpower Ministry", *The Straits Times* (15 March 2018), online: <https://www.straitstimes.com/singapore/economic-lift-boosted-job-opportunities-for-locals-mom>; See also Joanna Seow, "Foreign employment down by 32,000", *The New Paper* (16 March 2018), online: <https://www.tnp.sg/news/singapore/foreign-employment-down-32000>.

[162] Hawksford Group, "Hiring foreigners in Singapore is becoming more difficult. Here's why.", *GuideMeSingapore Hawksford* (2018), online: <https://www.guidemesingapore.com/in-the-news/2018/what-do-you-need-to-consider-when-hiring-foreign-talent-in-singapore>.

[163] *Ibid*.

[164] Hariz, Baharudin, "Pilot scheme to facilitate hiring of foreign talent in tech firms" Straitstimes, (31 July 2019), online: < https://www.straitstimes.com/tech/pilot-scheme-to-facilitate-hiring-of-foreign-talent-in-tech-firms>.

[165] Ernst & Young, 'ASEAN FinTech Census 2018' (2018) at page 30, online: <https://www.ey.com/Publication/vwLUAssets/EY-asean-fintech-census-2018/$FILE/EY-asean-fintech-census-2018.pdf>. See also, Lin Lin, "Regulating FinTech: The Case of Singapore" *Banking and Finance Law Review* (2019), forthcoming.

InsurTech holds huge potential benefits to both insurers and end-users. Nevertheless, InsurTech may also come with new risks such as cyber security and technology risk management. Thus, it is important that regulation supports InsurTech companies with reliance on meta-regulatory approach and principle-based regulations, and that regulators do not impose such onerous regulatory frameworks that they destroy the potential economic benefits which InsurTech promises.