

# Dynamic pricing in a fast-changing world

## COVID-19 Insurance in Thailand

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### Abstract

This paper uses the COVID insurance provided in Thailand from the early months in 2020 until the middle of 2021 as an anchor point to discuss the merits of dynamic pricing in insurance.

These insurance products started as a promising way to support the local population and were hugely popular but also profitable for the participating companies at first. This changed in 2021 when Thailand's situation turned around to worsen significantly and at the time of writing the first companies are trying to cancel existing policies to avoid severe losses.

After discussing the COVID-19 products in Thailand, this paper looks at dynamic pricing and how it could be used when the situation is fast moving and challenging for traditional pricing approaches to be applied.

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## Introduction

Since early 2020 the world has been faced with the emerging coronavirus disease 2019 (COVID), rapidly spreading through all continents, with governments and business reacting in different ways to the threat to its population and the economic impact.

This paper is not about COVID, as the pandemic at the point of writing is still ongoing and key battle grounds are continuously changing, but it will be used as an example of how the insurance industry must be able to react quickly to change in demand and new needs of the population, while often being confined within a tight regulatory framework.

The author will use COVID insurance in Thailand to highlight the need for dynamic pricing in the insurance industry to better serve its customers. COVID insurance in Thailand shows how good intentions can go wrong with lack of data and without the ability of the insurance industry to correct errors in judgment.

The Thailand COVID insurance details discussed in the following chapter are up to date until the 18<sup>th</sup> of July 2021.

## Thailand COVID Insurance in 2020

COVID-19 arrived in Thailand on the 8<sup>th</sup> of January 2020 through a 61-year-old citizen of Wuhan, who had just landed at Suvarnabhumi Airport in Bangkok and was detected with high-temperature upon arrival. She was confirmed as COVID-positive on the 13<sup>th</sup> of January, marking Thailand’s start of the worldwide battle against an invisible foe.

It took the Thai insurance industry less than one month, to offer COVID insurance to local customers. On the 6<sup>th</sup> of February, Bangkok Insurance offered a policy for 299 Thai Bhat (THB) with a payout of THB 50,000 in case of a positive test for COVID<sup>1</sup>. This was an equivalent of just under USD 10 premium for a USD 1,600 payout.

In total, eight local P&C companies drove the sales of COVID insurance in the first quarter of 2020 and by 18<sup>th</sup> of March already 2 million policies were sold, in a country of only 70 million people.

The policies offered by all companies were remarkably similar; THB 299 (USD 10) premium for THB 50,000 (USD 1,600) payout and low benefit for terminal illness or THB 699 (USD 20) premium for THB 100,000 (USD 3,200) payout with higher death benefit. The offer was for all ages and the only condition was no travel to China in the previous 14 days.

Of interest from an actuarial point of view is that the payout was in almost all cases a lump sum in the event of a positive COVID test and not a

**ใบคำขอเอาประกันภัย**  
กรมธรรม์ประกันภัยโควิด-19

ผู้ขอเอาประกันภัย: \_\_\_\_\_  
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 ขอใบคำขอเอาประกันภัย  ขอใบคำขอเอาประกันภัย

**คำเตือน:** ผู้ขอเอาประกันภัยต้องกรอกข้อมูลอย่างถูกต้องและซื่อสัตย์ หากผู้ขอเอาประกันภัยกรอกข้อมูลที่ไม่ถูกต้องหรือไม่จริง อาจส่งผลให้ผู้ขอเอาประกันภัยไม่ได้รับผลประโยชน์ตามสัญญา หรืออาจถูกเพิกถอนสัญญาได้

**ส่วนที่ 1 ข้อมูลทั่วไปของผู้ขอเอาประกันภัยและรายละเอียดการเอาประกันภัย**

1. ชื่อและนามสกุลของผู้ขอเอาประกันภัย: \_\_\_\_\_ ชื่อและนามสกุลเดิม: \_\_\_\_\_  
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 ทะเบียนบ้าน  อื่นๆ: \_\_\_\_\_

2. ที่อยู่ปัจจุบันอยู่ที่: \_\_\_\_\_ หมู่บ้าน/อาคาร: \_\_\_\_\_ หมู่ที่: \_\_\_\_\_ ซอย/ซอย: \_\_\_\_\_ ถนน: \_\_\_\_\_  
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 โทรศัพท์บ้าน: \_\_\_\_\_ โทรศัพท์มือถือ: \_\_\_\_\_ อีเมล: \_\_\_\_\_

3. อื่นๆ: \_\_\_\_\_ สถานที่ทำงานหรือหน่วยงานที่สังกัด: \_\_\_\_\_

4. แผนประกันภัยและประวัติการซื้อกรมธรรม์ (โปรดเลือกแผนตามความต้องการ)

ชื่อกรมธรรม์ของกรมการประกันภัย	จำนวนเงินเอาประกันภัย (บาท)			
	กรม 1	กรม 2	กรม 3	กรม 4
- กรมการประกันภัยโควิด-19	50,000	100,000	100,000	100,000
- กรมการประกันภัยโรคมะเร็ง	50,000	100,000	500,000	1,000,000
- กรมการประกันภัยอุบัติเหตุ	5,000	10,000	50,000	100,000
เบี้ยประกันภัยรวม (บาท) / คน / ปี	250	450	700	1,100

ชำระเป็น  เงินสด  เช็ค  โอนเข้าบัญชีบริษัทอยู่ที่: \_\_\_\_\_ ชื่อบัญชี: \_\_\_\_\_ สาขา: \_\_\_\_\_  
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 ชื่อและนามสกุลผู้รับเบี้ยประกันภัย: \_\_\_\_\_ ความสัมพันธ์: \_\_\_\_\_

5. ผู้รับประโยชน์ (ถ้ามี) ให้ระบุชื่อบุคคลที่ผู้รับประโยชน์ ให้อธิบายอย่างย่อ (ถ้ามี)

ชื่อและนามสกุลของผู้รับประโยชน์	อายุ	ความสัมพันธ์	ร้อยละของผลประโยชน์
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**ส่วนที่ 2 ข้อมูลเกี่ยวกับการเดินทางและสุขภาพของผู้ขอเอาประกันภัยและบุคคลในครอบครัว**

6. ในระหว่าง 14 วันที่ผ่านมา ท่านและ/หรือบุคคลในครอบครัวได้เดินทางไปหรือเยือนหรือพำนักในสถานที่ (Transit) ที่ประเทศจีนหรือฮ่องกง หรือ สิงคโปร์ หรือ มาเก๊า ไต้หวัน ญี่ปุ่น สิงคโปร์ เกาหลีใต้ อิตาลี และ อิหร่าน (รวมถึงประเทศจีนถึงตามประเทศทางระหว่างทางระหว่างประเทศและรวมตามจุดแวะจอด) หรือไม่  
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Figure 1 - Example COVID Insurance application

reimbursement for medical expenses. This insurance was targeted at low- and middle-class earners, for whom a COVID infection would have meant loss of earnings, and the money would help the family during that time.

These insurance packages would not only provide earnings protection in case of an infection but also helped to counter fears in the population towards an unknown disease.

The latter was one of the reasons, in the author’s opinion, that these products were made possible and even encouraged by the Thai regulator, the Office of Insurance Commission (OIC). In a market with mandatory regulatory pre-approval of novel products and a rather lengthy and rigorous approval process these products were made available in an exceptional short period of time. There was both strong demand by the public and expectation towards insurance companies to provide support.

### Promising at first

In 2020, the Thai P&C insurance companies sold 7.6 million COVID policies. This generated a total Premium Income of THB 4.2bn (USD 134m) which was an impressive 9% of the entire Accident & Health section and 1.6% of the total P&C market in Thailand in 2020.<sup>2</sup>

Clearly, there was a large demand by the Thai population for cover and the industry did well to provide the service very quickly when it was needed.

But as insurance professionals we also need to ask if it was sensible to provide the cover at these prices and contract designs.

Life insurance companies, esp. those with links to P&C insurers, also started to offer COVID insurance in 2020, but most sales occurred in the P&C market.

There is no public information available how much profit was generated in 2020 through COVID insurance packages. However, it is easy to make estimates at this point:

- Positive COVID tests in Thailand in 2020: 6,884, equivalent to a 0.01% positive rate of the Thai population.
- As the COVID policies were sold independent of age, profession etc. but primarily in urban centers like Bangkok, we can assume a slightly higher rate of infection in policyholders relative to the nation-wide rate of positive cases. Doubling the rate of infection leads to an estimated payout of 1,500 policies in 2020.
- Maximum coverage was THB 100,000 (USD 3,200).

Company Name	USD
DHIPAYA INSURANCE	43,733,664.00
VIRIYAH INSURANCE	20,395,616.00
MUANG THAI INSURANCE	15,329,984.00
SYN MUN KONG INSURANCE	15,114,400.00
DEVES INSURANCE	12,349,408.00
ASIA INSURANCE 1950	10,503,520.00
BANGKOK INSURANCE	8,182,944.00
ASSETS INSURANCE	4,950,400.00

Figure 2-COVID insurance income 2020 by company

- Resulting in a conservatively estimated payout of THB 150m (USD 4.8m) or a loss ratio of 5% when assuming 70% of premium earned in 2020 as most sales were in Q1 and Q2.
- Acquisition costs in Thailand are around 25%, not deferrable, and industry OPEX is 11% on average.
- Estimated Combined Ratio for 2020 is therefore 41% with an Underwriting Profit of THB 1.7bn (USD 55m)

GWP	4,167
NEP	2,917
Policy Payouts	-150
Acquisition Costs	-729
Operating Costs	-321
Underwriting Profit	1,717

Table 1 - Estimated 2020 Numbers for COVID insurance in Thailand [Million Thai Bhat]

To put this number in perspective, the entire Thailand P&C Insurance market in 2020 achieved an Underwriting Profit of THB 12.5bn<sup>3</sup> (USD 403m). COVID insurance contributed an estimated 14% to the P&C market profit and looked like a large income generator for the Thai insurers who wrote these policies.

Based on the average operating expenses and acquisition costs used above, a positive test rate of below 0.45% in the full year would result in an UW profit for the insurers and any higher rates would result in a loss. At the start of the pandemic, it was understandable that insurance companies thought of an infection rate of 0.45% as quite high and expected the outcome to be profitable.

Country	COVID Positive Rate
New Zealand	0.04%
Thailand	0.01%
South Korea	0.12%
Japan	0.19%
India	0.74%
South Africa	1.78%
Germany	2.10%
Brazil	3.61%
United Kingdom	3.68%
Austria	4.01%
USA	6.07%

Table 2 - Percentage of Population tested positive for COVID-19 in 2020

But if we look at other countries from where we are today, we see that Thailand was fortunate in 2020 to have such low rates.

The table on the left shows infection rate in 2020 in a small selection of countries and red highlights countries in which the above COVID insurance would have made losses.

It highlights that Thailand was one of the very few places where the COVID insurance as described above could have been profitable. A large increase in cases would have resulted in substantial losses to the industry.

## Does this mean the Thai Insurance industry was just lucky in 2020?

A few points suggest that Thai insurers were indeed lucky in 2020. Prices for the COVID products were all the same, or at least very similar, which suggests lack of actuarial assumptions and that insurers were largely following each other.

But this was also not a random bet, instead local insurers relied on ‘soft’ information, which is exceedingly difficult to include in classic pricing approaches, to conclude that an infection rate of 0.45% was unlikely.

There was little to no statistical information available in early 2020 but there were reasons to believe Thailand would perform quite well in the early stages of the pandemic:

- Thailand was in the Top 10 of Global Health Security Index pre Covid.<sup>7</sup> Figure 3 on the right shows Thailand between the top countries on Pandemic Preparedness.
- The country is used to infectious and tropical diseases.
- Lessons have been learned out of the 2003 SARS outbreak.
- Population is well used to masks wearing and hygiene rules.

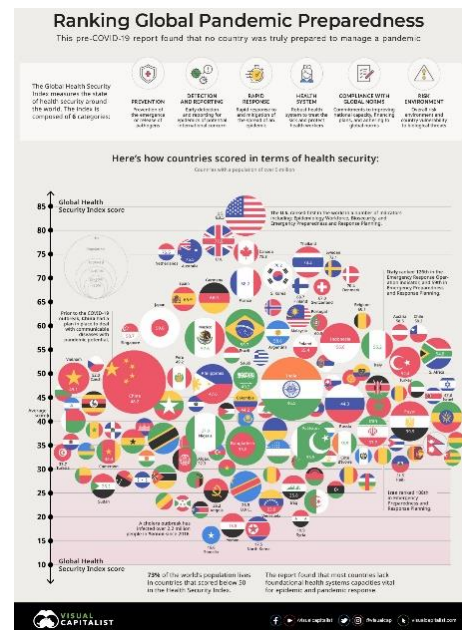


Figure 3-Thailand is in the top group of Pandemic Preparedness in 2020.

The conclusion seems to be that Thai insurers understood that their country would most likely contain COVID and saw an opportunity to support the population without the risk for large losses.

### Early 2021 – The new focus on Vaccine Insurance

As shown above, the COVID insurance offered by Thai companies in early 2020 achieved a profit to the insurance companies at first. However, the situation started changing in Thailand in late 2020 with a slow increase in cases, which in early 2021 then resulted in several clusters and acceleration of caseloads.

First, insurers started to replace the existing lump-sum payout products with coverage of medical expenses to the same limit. This significantly reduced the risk to insurers as asymptomatic patients and patients without the need for expensive treatment like ICU would not claim to the full amount. It also helped to mitigate moral hazard, as stories emerged in Thailand about people intentionally infecting themselves with COVID to claim insurance benefits under the lump-sum policies.

At this point we would like to highlight that the full pay-out COVID policies in Thailand broke one key principle, which insurance products are based on, the principle of Indemnification:

*“An insurance policy shall not provide compensation to the policyholder that exceeds their economic loss.”<sup>10</sup>*

This basic insurance principle was not met in the Thai COVID insurance packages as the pay-out was often fixed and policies were underwritten without assessment of income.

In this case policy holder could financially benefit from getting ill. It was even possible to buy several policies from different insurers at the same time, which would be considered over-insurance for regular products but, as the benefit was not linked to costs incurred, no over-insurance principle applies.



Even though most of the population saw COVID insurance as a protection, the products also enabled some customers to make profits from getting the disease. While this is not the core reason for the failure of these policies, the lack of indemnity principle worsened the impact on the participating insurers.

In Q1 of 2021, 15 P&C insurance companies out of a total 62 in Thailand started to further diversify by launching new policies that cover COVID-19 vaccine side effects, offering compensation and medical treatment for policyholders suffering from side effects caused by a vaccine against COVID.

Because vaccines are considered as elective care and medical costs related to side effects are excluded from most health insurance products in Thailand, there was strong demand from the population and interest from the regulator to support a fast vaccine roll-out in Thailand.

Bangkok Insurance again was the first to start marketing these COVID side effect policies, offering premiums as low as THB 99 annually, up to 859 baht per year. For the holder of the THB 99 policy, the maximum payout would be THB 100,000 for medical treatment and hospitalization resulting from COVID vaccine side effects. (3 USD premium for max. USD 3,200 payout)

Other companies, Muang Thai Insurance for example sold THB 99 – 600 policies, which would pay up to THB 1 million of compensation (USD 32,000).



Figure 4-Vaccine side-effect Policies in Thailand

Some companies extended their existing COVID infection policies for vaccination side effect as well as selling new policies for vaccination side effects. There was still hope that diversification would offset the future losses occurred through existing fixed pay-out policies.

### Mid of 2021 – The Market deteriorates

The Thai insurers were now trying to adjust new policies and focus on vaccine coverage and medical expenses but were still under the impression to be able to maintain profitable COVID policies. Companies had managed to match the demand of the public, calm fears, support the government while remaining profitable.

But in Q2 of 2021 the situation changed drastically in Thailand. To remind the reader, in 2020 the total number of COVID cases was 6,884. On the 8<sup>th</sup> of July 2021, the number of cases on a single day exceeded this value for the first time with 7,058 new infections and Thailand recorded more than 300,000 cases in the first half of the year 2021, almost 44- times the case load of the whole year 2020.



Figure 5 – Single payout COVID insurance sold by Big-C broker in April 2021

No public data is available how many lump-sum payout COVID insurance policies are still in existence in 2021 as companies have recently been selling vaccine side-effect, medical expense as well as lump-sum payout policies.

But the following is known:

- Companies have still been selling lump-sum payout insurance until at least April 2021. The last policies sold included some extra requirements, for example in the previous one month the applicant has not stayed in an area designated as high-risk by the government, but apart from this, the overall conditions remained the same as in 2020.
- It was also still possible until at least May 2021 to renew policies from 2020 with lump-sum payout.

In early 2021, the insurance industry was still expecting for the COVID situation to improve and policies to be profitable as in the previous year. Due to increases in cases in early 2021, sales figures for policies were rapidly increasing.

But the OIC announced in early July that by end of June the claims ratio of all COVID insurance had already increased to 35.9%<sup>9</sup>. While this is still profitable, leading to an estimated CoR of 72%, the increase in claims was accelerating fast.

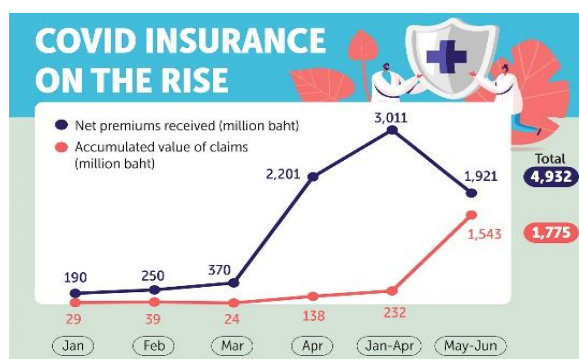


Figure 6 - COVID insurance sales in the first half of 2021<sup>5</sup>

Then on the 16<sup>th</sup> of July Syn Mun Kong Insurance Public Company Limited (SMK) announced the cancellation of its inforce COVID lump-sum policies citing a severe public health crisis.

*“Given the unfathomable situation of the pandemic, Syn Mun Kong Insurance needed ensure an efficient risk management and decided to cancel the “COVID 2 in 1” coronavirus infection insurance policy (...) by terminating coverage under the above insurance after the expiration of 30 days from the date the policy holder is notified by letter.*

*The company will return premium to the policy holder within 15 days from the date the insurance policy expires, which is proportional to the unexpired portion of the policy.”<sup>6</sup>*

SMK is a relatively large insurance provider in Thailand and must have been aware of the likely backlash this could cause and must have assessed the potential future losses to be material enough to accept the bad publicity is the lesser evil.

The insurance regular reacted on the following day, asking SMK not to cancel the policies. But whether SMK cancels or honors the policies, the reputational damage is already done, not only for SMK but for the entire insurance industry.

The timeline presented in this paper must finish here but it is certain that the coming months in Thailand will be very challenging for any insurer who sold a large quantity of COVID policies.

## Thailand COVID insurance summary as of Mid-2021

- In 2020 COVID insurance fulfilled a need for Thai citizens to protect their families against loss of earnings in case of infection.

- Insurance companies were fast to release products with limited actuarial data available for robust technical pricing.
- When it became obvious that the original products would not be sustainable in the long term due to increase of infection rates and new COVID variants, companies tried to modify their products to still meet the customers need but reduce the risk taken.
- With the emergence of vaccines, companies were helping to reduce vaccine-reluctance through side-effect products. Again, with limited data to price fully technically.
- The situation deteriorated rapidly in the middle of 2021 when the low premium and lump-sum payout COVID insurance became unsustainable, and SMK was the first company to try to cancel its policies.

The Thai insurance industry's reaction to COVID-19 started in 2020 as a positive example where the industry was able to work with the regulator, react quickly and offer new products to help the general population in the fastest possible way.

The author's opinion is, that the original idea of COVID insurance was positive and helped to reduce fear and fill a need of the Thai population.

However, there was a large concentration risk from the start due to the large volumes sold in only a few months, which was too large for diversification over time. Hence with exposure locked in through one-year contracts, the companies faced significant risk in case of sudden changes.

And ignoring the principle of indemnification has led to anecdotal evidence that some policy holders are actively trying to get infected to claim on the policy in the current challenging times. The policies have in this case become counterproductive in the fight against COVID.

The Thai insurers currently cannot adjust the existing policies sold early in 2020 despite increasing rates of infection and instead had to stop the sales of products and in sometimes even try to cancel existing policies during their policy term.

Insurers are used to taking risks, but they are now faced with disproportionate number of losses or even solvency issues.

The COVID insurance products could have been a success if:

- Coverage would from the beginning have followed the indemnification principle and be limited only to medical expenses occurred and a daily rate for loss of earnings due to hospitalization or quarantine.
- Insurers could have found a way to slow down sales volumes and distribute more evenly across the year.
- Dynamic pricing would have been allowed and applied due to the exceptional uncertainty in future development.

On the following pages will we focus on dynamic pricing and how it could have been used the COVID insurance as an example.



## Examples of Dynamic Pricing

First, let us look at Industries where dynamic pricing is common today, which Oxford Languages defines as “the practice of varying the price for a product or service to reflect changing market conditions, in particular the charging of a higher price at a time of greater demand.”<sup>8</sup>

### 1. Travel Industry

Today dynamic pricing is common across the travel industry. Hotel prices are updated based on demand through popular booking portals, similar for private rentals and car rentals. But the most visible area are airlines and especially budget carriers.

Typical the price of an airline ticket is based on the following:

- Fixed price for fuel surcharge, landing fees etc.
- Base ticket price driven by demand and current occupancy rate.
- Extra charges for seat location, food, and services.
- Pre-purchased Luggage allowance.

The airline’s target is to maximize profit through catching all customers along the value chain, e.g., the backpacker on a shoestring budget who needs to book early and takes the minimum of luggage as well as the last-minute business traveler who wants an emergency exit seat and fast boarding. Dynamic pricing has allowed airlines to sit along a large region of price elasticity of various customers.

### 2. Banks and tracker mortgages

A prime example to show that customers can accept changing prices also in financial services are tracker mortgages used in many countries. These are mortgage loans where the rate paid by the consumer is based on an external rate, usually the local central bank’s base rate, offset by a fixed amount or factor. The mortgage tracks the base rate and by this way banks can pass on the risk of changing yields to the customer and in return offer a lower rate during low base rate years.

Pricing here is not demand driven but based on an external factor, the base rate. Insurance could do something similar where the premium is adjusted based on an external factor, in this case COVID infection rates in Thailand.

### 3. Variable Annuity payouts

The Insurance Industry also already offers products which have changing payout in the form of Variable Annuities. Offered by Life Insurers, the annuity payout is typically monthly and varies with the underlying investment performance of the portfolio and hence can increase or decrease. Another example of varying returns would be Unit Linked Policies or With Profit Share policies.

## Dynamic Pricing in Insurance - Risk and Demand

The typical examples shown in the previous section are either based on Supply and Demand or the prices are based on an external factor, e.g. interest rates. The difference to traditional business being that the internet and modern technology has allowed the price adjustments to be faster and quasi real-time.

For the COVID insurance introduced earlier, dynamic pricing would have to be based on estimated risk instead of demand, which is a quite different approach. Today insurers adjust prices if the risk changes but typically only at policy renewal and the industries speed of implementation is slow compared to price changes in online driven markets.

In the following we focus on general insurance as compared to life insurance due to the typically shorter contract length; this does not mean the same cannot be applied for life insurance.

The Profit of a general insurance contract can quite easily be expressed as:

$$\text{Profit} = \text{Premium(P)} - \text{Acquisition(A)} - \text{OPEX(O)} - \text{Claims(C)}$$

As this paper focuses on short term covers of one year, investment returns are excluded for simplicity.

Let us look at the three cost factors A, O and C individually with the view on dynamic pricing:

**Claims(C):** As actuaries we tend to calculate the expected claims ratio, based on given risk parameters, before the product is created. But the COVID example in Thailand shows that this is not necessarily the case. Expected Claims can develop across the lifetime of an insurance contract, both in frequency and in severity. COVID is in extreme case, but this can also apply to traditional insurance:

- A newly introduced and lower speed limit could drastically reduce Motor accident rates.
- A new healthy living scheme by the government with tax deductibles on gym membership should impact Health Insurance Costs.
- New legislation on Health and Safety will reduce claims on PA and Liability.

But even on an individual level:

- A smoker who stops will gradually reduce his claims risk on Health Insurance.
- A person who changes jobs and commutes less should not continue to pay the same car insurance rate until the policy renews.

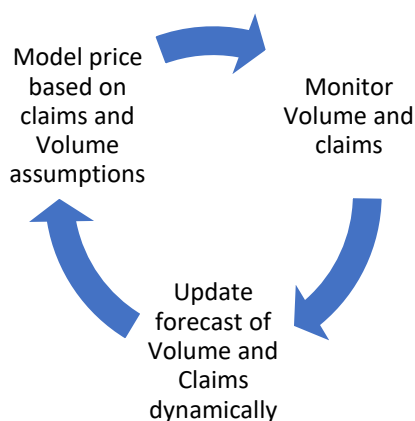
In all the above examples, insurers will typically adjust prices long after the event occurred, when updated claims data is available and when policies are renewed. Dynamic adjustment of prices based on expected claims experiences is not common today.

**Fixed OPEX and Acquisition Costs:** For this paper, we would like to split costs into fixed and variable. In General, some operational or acquisition costs are fixed, for example building rental, core staff personnel costs like senior management or partnership deals with fixed up-front fees.

For dynamic pricing these fixed costs mean that our price should be based on volume sold. We need a critical mass of policies to cover our base expenses, and once this mass is exceeded then insurers could be able to reduce prices to customers gradually.

**Proportional OPEX and Acquisition Costs:** Other costs typically are linked to number of policies or Premium. Commissions for agents are often based on premium written and cost for call centers etc. grow with the number of calls and customers.

Now to use the inputs above to price dynamically, the theoretical approach is easy:



In the following section we will try to show this on COVID cover in Thailand.

### Full dynamic pricing applied to COVID Insurance in Thailand

Let us apply the above method with a typical pay out of THB 100,000 if tested positive for the disease.

To start, the author would like to clarify that this is for illustrative purposes to discuss dynamic pricing and not to build a full COVID model for Thailand.

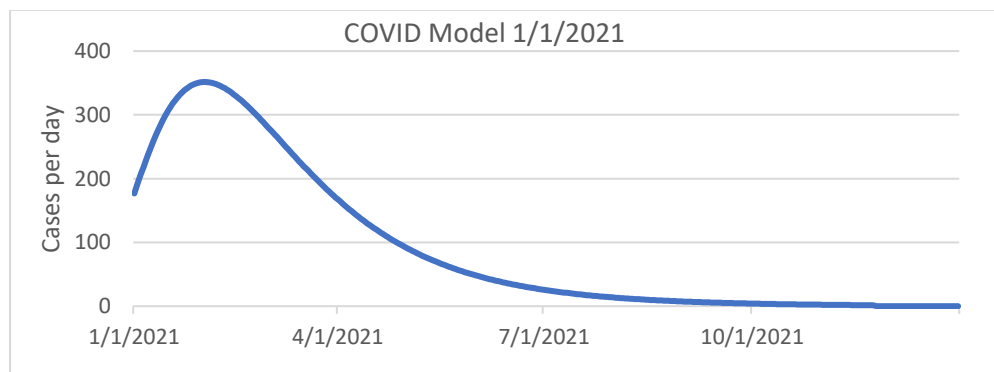
We assume for simplicity that the likelihood of an infection is evenly distributed in the population, without any loading for urban centres like Bangkok.

Base assumptions:

1. OPEX is fixed at THB 30 (USD 1) per policy due to the simplicity of the Insurance.
2. Acquisition costs at 25% as typical in Thailand if sold through Partners or Agents.
3. Pay-out is set at THB 100,000 per positive case

On the 1<sup>st</sup> of January 2021 Thailand had 216 new COVID cases and was confident to get the pandemic again under control as in 2020.

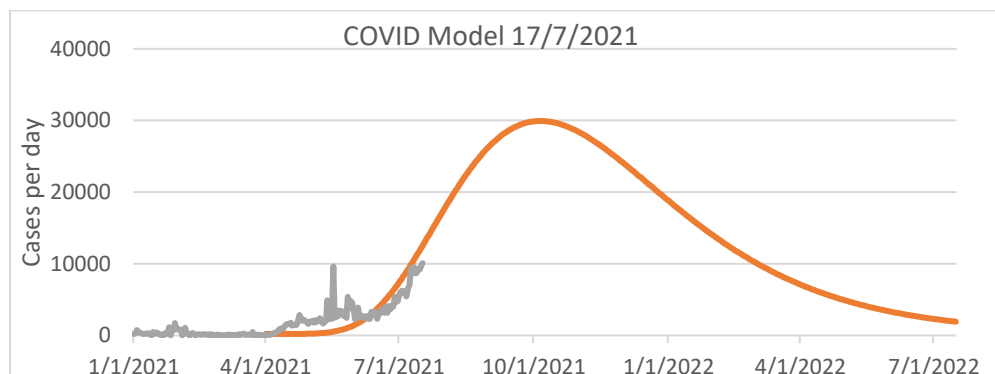
The next chart shows a lognormal distribution used to estimate case development. The peak of cases would have been at 300 per day in early February and then slow decline until third quarter of the year. This is based on the situation on the 1<sup>st</sup> of January.



If we look at other countries and the development of COVID in 2020 than a lognormal seems a sensible choice for the distribution to get to a simple model.

With this assumption total cases in 2021 would have been 33,350 and minimum price of COVID insurance could be set as low as THB 104 versus the THB 699 typically charged. In early January this was indeed a sensible assumption to make and hence some insurers continued to sell policies.

Now if move forward to the 17<sup>th</sup> of July 2021 and construct a new Model:



The grey line shows the actual development so far and we applied again a lognormal distribution. Based on new assumptions driven by recent increases, the cases will peak above 30,000 per day and will not decline before October 2021. This again is only an estimate based on vaccination rate and current situation in Thailand.

In the second chart just under 6 million people will get the disease over the next 12 months and the current price for COVID cover must be THB 11,500. More than 100 times the estimate from 1<sup>st</sup> of January and well above the THB 699 market price.

Clearly the situation has changed significantly and hence some insurers stopped selling full pay-out cover from April 2021 onwards.

Our current regulatory environment makes it difficult or impossible for insurers to update the price during the contract period, hence in return companies monitored the development and pulled the existing products when they were not viable anymore and replaced with products with lower coverage. And when this was not justifiable anymore, insurers were forced to cancel existing policies.

This is not in the interest of the Insured or the insurer.

Would costumers even purchase protection for THB 100,000 if it costs THB 11,700? Price sensitivity alone is not the only factor to consider. If prices increase significantly, anti-selection and moral hazard are other components which need to be taken into account. The only people willing to pay this much for COVID cover might already be in a very high-risk of infection.

While all this is an issue, in the authors opinion, in the current situation the options are worse because the environment forces insurers to try to cancel policies and to stop the service altogether instead of allowing to try to find an agreeable solution.

This is a very extreme situation, and the sharp increase of cases would even make a dynamic pricing model difficult to maintain in the long run.

But the author hopes that this example has given some ideas of why the insurance industry and regulator should investigate ways to dynamically price products.

The current environment forces insurers to be very risk-averse and therefore limits access to products often to the healthiest and least risky customers. With dynamic pricing we give both insurers and customers a choice to provide cover in areas otherwise too unpredictable to cover.

Other businesses, from airlines to hotels to gym memberships, have shown that customers are able to accept prices based on demand. We deal with risk more than demand; the industry should accept that it is also possible to accept prices based on customer risk behaviour as well as changing external factors.

## Points for discussion

In the previous chapter we have used COVID insurance in Thailand as an example where there is a need in the population for insurance protection with extraordinarily little data for actuaries to price accordingly.

The author suggests that we should allow insurance companies to adjust prices dynamically, not just for new but also existing policies, to be able to offer services when the situation is changing quickly.

In this paper the author focuses on premium adjustments, but dynamic pricing could also mean frequent update of benefits received. From a point of affordability versus insurance need, in some situation this would be the more successful approach.

The alternative is to provide no protection at all.

However, this raises some additional questions:

### **Can we charge higher risk retrospectively?**

The typical assumption on General Insurance policies today is that policies are bought for one-year, with some exception in travel and cargo for example, and that the price cannot change until renewal.

This paper is challenging this assumption, not just in extreme cases like COVID. With today's technology the customers should benefit if positive developments occur, and we should allow companies to adjust prices if factors outside their control significantly increase risk.

This dynamic adjustment of prices would result in lower buffers and hence a lower base price for the consumer. If the situation does not deteriorate, but improves, the customer can benefit from lower premium.

### **How can this be extended to impaired lives?**

Today it is often challenging to find health or life cover for people with diabetes for example. Actuaries need to include into the price the likelihood of the person ignoring health advice but if are allowed to change pricing during the lifetime of a policy, we can reward people who live healthy and increase prices for customers who do not. Policies should be allowed reward holders who monitor their personal parameters daily and reduce insurance costs close to the same level of someone who does not have diabetes. Today we use at best no-claims bonus as a very crude measure to reduce price at renewal. Modern technology should allow us to pass on benefits faster.

This way, Insurance could help to change the mentality and associated healthcare costs of future generations.

### **How much is the Critical Mass?**

In the simplistic model discussed in this paper, the author assumes a fixed operational expense per policy which does not increase or decrease with the risk or volume. But this means a certain critical mass is needed before these policies would become viable. This going beyond this paper but any insurer who wants to create a dynamically priced policy would have to decide how many policies need to be sold for this process to succeed and also how to include benefits of scale.

### **How do we ensure the companies do not use dynamic pricing only to their advantage?**

Probably the most critical point for debate is, how to ensure that benefits are passed on via price reductions as much as adverse effects are counted for through increases? It could be tempting to use dynamic pricing to increase profitability without passing on benefits to the consumer.

The author believes that an efficient market will ensure that benefits go to the consumer as competing insurers would drive prices down. But dynamic pricing might still require a quite different regulatory framework to ensure policy holder benefits are at the core.

## Conclusion

COVID-19 insurance in Thailand started as an excellent idea to support the public in the time of crisis. But product pricing had to be done at a time when little information was available to price the risk. This has led to Thai insurers now, in July 2021, facing potentially never experienced losses. This is partially a result out of ignoring the principle of indemnification, by offering potentially profit-making pay-outs to the insured, but mostly due to the development of COVID cases in Thailand and an ever-changing risk profile.

COVID-19 is a very extreme situation, but the author believes that it highlights the need for insurers and regulators to adjust faster to the external environment impacting our pricing. Insurers have not moved as quickly as other industries and have rarely taken advantages of the latest technologies to allow for more flexible pricing to benefit the consumer.

This is also due to a conservative regulatory environment which often doesn't allow insurers to adjust their pricing when needed.

Future challenges might not impact our lives as quickly as COVID did, but the author expects that for example mental health impact on the population because of the pandemic will be another increasing risk, currently not well priced in many Health Insurance policies.

But the need for fast pricing does not only apply to Health; 2021 has also shown that the impact of global warming will become ever more visible, and insurers need ways to handle the growing demand for protection, which will be difficult to meet without being able to price according to the increasing risk.

Insurers' pricing capabilities need to move as quickly as the external environment changes, and we need to rapidly develop our capabilities and work with the regulators to ensure protection remains possible and affordable and dynamic pricing is one way to support this goal.

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