Assignment 3: Mining and Deutsche Bank (A) - (B)

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Part 1: Mining Bitcoin

See *HW3_CHENG_DAXI.R* for r script.

Results we got:

One possible nonce is **12452**. However, this nonce is not the only solution that satisfies the rule. The hash of the blockheader is "0009e766bc42829a78b16ea6fc5bf924c38284c487515a188d404648770046b2".

Part 2: Thinking about mining Bitcoin

(a) In order to win, I would start from 1 and move and then try different numbers according to the ordering rule (2,3,4…). This way I can always be one number ahead of the competitor. Since we have the same computational ability, if the answer is larger or equal to 1, I would win. Only if the answer happens to be exactly 0 that I would lose. The probability of the answer is no less than 1 is much larger than it is exactly equals to zero.

(b) The ideal solution would be just have stronger computational ability and you can win, however, here we just assume that same as in (a), we have same level of computation power. If another smart guy takes the strategy in (a), I would start from 2 and then try different numbers according to the ordering rule. Same as the analysis in (a), we would always be the fastest if the answer >=2. Similarly, if more and more people enter into the market taking the strategies we generate in each steps, we would just simply move our starting number from 2 to 3, 4 and latter on. So we can see, as the number of competitor grows, our chances of winning would shrink since the probability that the answer is no less than N would decrease as N increase.

(c) As we have already analysed in the previous questions, since we all have same level of computational ability, if miner follows some sort of pattern in their mining process, the easiest way to compete against him is just try one step ahead of him. And other people, knowing that, would just try one step ahead of me and so on. So in equilibrium, everyone would follows a random guess which is no pattern and the winning chances for each miner would be equal.

Part 3: Deutsche Bank A and B

(a)

There were few steps and decisions they made in order to prepare commercialization of blockchain technology. It took 8 months to kick off POV(from Aug 2014 to April 2015) and they finally confirmed a feasibility of commercialization on Dec 2015.

1. They started from raising an awareness inside the organization which was led by three different divisions and heads of them (i.e. Head of Global Markets, Head of Debt market structure, Chief Digital Officer of Global transaction bank). Those three heads shared their opinions on their internal social platform and blogs because they understood that there should be certain amount of motivation before they practically move on to a real action. After they attracted certain amount of interest inside of the organization across the levels and expertise they launched a first official department in the name of Labs in London, Berlin and Silicon Valley. the Labs worked collaboratively and creatively because their job was at the PoC stage and this made members of the team from many different area share their thoughts and information without hesitation.
2. It was very challenging and audacious decision to work on Smart Contract Bond or Smart Bond. Those leaders from the beginning made a clear judgement that the most promising area of application(Distributed Ledger Technology) appeared to be in securities settlement and clearing. They experimented by issuing an imaginary corporate bond and tested it. They modeled ‘Smart Bond’ using real bond term sheets by working collaboratively among IT people and bond people.
3. Finally, they made a decision that they will not reach to the commercialization point even though the technology was feasible because of verification issue, risk sharing issue and finally commitment concern. They admitted that there were certain obstacles before DLT(distributed ledger technology) take on in a real world.

Key decisions were many; Those heads of the department took on a job in a sequence so that a big organization like Deutsche Bank engages with a new technology without resistance. They chose a smart bond as a best area using BLT because they oversaw that securities settlement and clearing was the most promising in permissioned blockchain system.

(b)

Deutsche Bank should move to real execution. Before initial commercial operations, the bank should test critical functions in the system such as funding check, interest payment, maturity, etc. Then, they will actually create corporate bond smart contract, set up distributed ledger platform, and execute the contract for tests.
The key issues include legal, political, and market obstacles. For example, who verifies that the smart contract will execute as intended. Is it enough to have all participants to verify legal issues of the transaction contract. Also, risk sharing concern should be dealt.

At this stage of PoC and PoV, there is no standard protocol that what is the answer. Deutsche bank may need to set up a new standard as they address this issue. They first need to find group of partner banks to work with as referred in the article(B). In a corporate bond market, for example, is huge. Even if Deutsche bank made a success in commercialized technology, companies won't be willing to join Deutsche bank's DLT without other banks cooperation and joining.

Internally, more practical concern is that how much do they need to commit to proceed to this level. As a massive bank, it is very important to persuade their customers and employees that their direction is right. It says that ensuring commitment and adoption is very important as they move on to new technologies since it needs great amount of upfront effort. Therefore, reaching a consensus inside the organization is the first thing to be done to create the value from blockchain technology.

(c)

Yes. Deutsche Bank should grasp the opportunity.
Here is a list of the opportunities and advantages we summarized for Deutsche Bank to join the new consortium.

1. First of all, the bank was inspired by new technologies and proposed a "Strategy 2020" to become a digital bank. Increasing efficiencies through automated processes and new technology is their strategic objective. Joining the consortium and collaborating with other parties allows Deutsche Bank to accelerate its path to improve efficiency. From the strategic outlook, Deutsche Bank is going to deliver the

first commercial examples in 2018. The bank could probably be supported by other partners if they join the consortium.

2. Secondly, Deutsche Bank has already made several progress in block chains. So it would generate cumulative advantages if they could join the consortium and work with other banks together.
3. Next, Deutsche Bank needs to commercialize their technology from the Lab. The bank will need to set up distributed ledger environment and verify the code of contracts. The new consortium aims to test multi-participant setup and market-infrastructure implications. The consortium's goal fits the current need in Deutsche Bank. It would be beneficial to join the consortium.
4. From practical perspective,Edward Budd, Chief Digital Officer at Deutsche Bank's Global Transaction Bank believes that joining the consortium is financially and legally feasible.
5. Regarding the technology of blockchain itself requires a distributed ledger framework that requires other banks to participate in this whole picture. Joining the consortium would make it easier to commercialize their technology.

However, there are also some concerns about this decision that can't be ignored:

1. The major concern is their intellectual property. Since Deutsche Bank has already spent several years developing new technology, they still have technology barrier compared to other partners.

Another feasible approach is that Deutsche could become a member bank who makes financial contribution and then collaborate closely when they think it is mature. In conclusion, Deutsche Bank should grasp the opportunity and join the new consortium in order to accelerate its path in commercialize its new technology.