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20 March 2018

Commissioners Peter Harris AO, Stephen King, and Julie Abramson
Productivity Commission
Level 12, 530 Collins Street
Melbourne VIC 3000, Australia
Submitted online: <http://www.pc.gov.au/inquiries/current/financial-system/make-submission#lodge>

Dear Commissioners

Draft Report – Inquiry into Competition in the Australian Financial System

I write to provide a submission on behalf of the Australian Taxpayers' Alliance in response to the Draft Report in the above inquiry.

Our submission is limited to the issue of interchange fees. In our view, the recommendation regarding interchange fees in the Draft Report is based on a misunderstanding of the role of the interchange fee within the current payments system. Fundamentally, the recommendation is inconsistent with the inquiry's stated goal of encouraging competition and improving consumer outcomes. Instead, this submission provides the Commission with alternative recommendations that would boost competition and innovation in the payments system.

This submission provides extensive information on this issue and trust it will be of assistance to the Commission.

The Australian Taxpayers' Alliance would welcome the opportunity to address and questions at a public hearing. Do not hesitate to contact me on (02) 8964 8651 or tandrews@taxpayers.org.au.

Yours faithfully

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Submission to the Productivity Commission on the Draft Report into Competition in the Australian Financial System

Tim Andrews
Australian Taxpayers' Alliance

March 2018

Introduction

On 7 February 2018, the Productivity Commission ('Commission') released its Draft Report into Competition in the Australian Financial System ('Draft Report'). While the Draft Report discusses a number of reform options, this submission is limited to providing a response to the commentary and recommendations about interchange fees. The overview of the Draft Report summarises the initial position taken by the Commission on interchange fees.

> Regulation of bank interchange fees and surcharging has proved complex and there is little genuine commercial justification for interchange fees. The Payments System Board of the RBA should ban, by mid-2019, all card interchange fees as a way to lower overall costs to users.[1]

Further, the Draft Recommendation 10.3 calls for the Payments System Board to "…introduce a ban on card payment interchange fees by mid-2019. Any remaining fees should be directly related to the costs of operating the system. Such fees should be made transparent and published."[2]

About the Australian Taxpayers' Alliance

The vision of the Australian Taxpayers' Alliance ('ATA') is to transform Australia into the low-tax, small-government market-based economy needed for continued personal and economic prosperity. The ATA has a high degree of expertise around financial regulatory policy and interchange fees. In 2015, the ATA made a joint written submission along with the International Alliance for Electronic Payments to the Senate Economics References Committee Inquiry into Matters Relating to Credit Card Interest Rates and gave evidence at a public hearing.[3] In 2016, the ATA made a submission to the Reserve Bank of Australia's ('RBA') Card Payments Systems Review – which was the public consultation process in reviewing the standards applicable to interchange fees.[4] In 2018, the ATA filed a brief as *Amicus Curiae* in the Supreme Court of the United States of America in the matter of *State of Ohio v American Express* correcting evidence before the court about Australia's interchange fee regulation.[5] This submission restates and draws together our previous work on this issue.

Outline of position

The ATA respectfully submits that the current draft recommendation is based on a misunderstanding of the role of the interchange fee within the current payments system. Fundamentally, the recommendation is inconsistent with the inquiry's stated goal of encouraging competition and improving consumer outcomes. The Commission should abandon this position. Instead, the

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[1] Draft Report, p. 26.
[2] Draft Report, p. 40.
[3] Australian Senate Inquiry into Credit Card Interest Rates, Joint Submission of Tim Andrews of the Australian Taxpayers' Alliance and Iain Murray of the International Alliance for Electronic Payments, August 10, 2015. Available at: https://www.aph.gov.au/DocumentStore.ashx?id=260f05ed-c466-4f1e-abb4-dd76a525716d&subId=400547
[4] Reserve Bank of Australia's consultation on Draft Standards for Credit Card Payments, Submission of Tim Andrews and Aaron Lane of the Australian Taxpayers' Alliance, February 2016. Available at: http://www.rba.gov.au/payments-and-infrastructure/submissions/standards-for-card-payments-systems/pdf/australian-taxpayers-alliance.pdf
[5] Supreme Court of the United States of America, *State of Ohio v American Express Company et al* [2018] Brief of the Australian Taxpayers' Alliance as *Amicus Curae* on behalf of respondents. Available at: http://www.supremecourt.gov/DocketPDF/16/16-1454/28936/20180123151940225_Amicus%20Brief.pdf

Commission should recommend that the government:

(1) deregulates interchange fees; and

(2) establishes a specialist regulator for payment systems.
These alternative recommendations would improve competition in financial payment markets and stimulate innovation.

This submission is based on four key propositions.

1. The regulation of interchange fees is based on poor economic theory.
2. There is no empirical evidence justifying proposals to further increase regulation of interchange fees, particularly as the RBA tightened regulations in 2016 and the economic theory and evidence actually support complete deregulation of interchange.
3. The Draft Report overemphasises the costs of interchange fees to merchants without properly recognising its corresponding benefit to consumers. Consumers will suffer economic loss if interchange fees were banned.
4. The RBA is not well placed to regulate payment systems as payment systems are a distinct regulatory function from conducting monetary policy. Hence, a specialist regulator is required. This reform is particularly urgent given the emergence of crypto-currencies as an alternative payment mechanism and the economy-wide benefits of blockchain.

Attachments to this submission

The ATA provide the Commission with four expert reports in support of our submission:

- **Attachment 1 – Sinclair Davidson and Jason Potts, 'Australian Interchange Fee Regulation: a regulation in search of a market failure', 2015.**

In this report, Professors Davidson and Potts show that the RBA have engaged in an extensive regulatory intervention based on poor theory with no empirical evidence and that it is not clear that consumers have received any benefits. The authors argue that interchange fees are the outcome of an efficient bargaining process given that banks and consumers, and banks and merchants, form long-term relationships with each other in a two-sided, rather than a conventional one-sided, market.

- **Attachment 2 – Sinclair Davidson and Jason Potts, 'Who Should Regulate the Bank Interchange Fee: The RBA or the ACCC?', 2015.**

In this report, Professors Davidson and Potts explore the dual statutory functions of the RBA as a central bank and as a regulator of the payments system. Economic theory suggests that these roles should be separated, and that payment system regulation should instead be conducted by a specialist agency.

- **Attachment 3 – Jason Potts and Trent MacDonald, 'Who Should Regulate Bitcoin? Challenges and opportunities for blockchain technology in Australia', 2016.**

In this report, Professor Potts and Dr MacDonald explore the potential of using blockchain technology to facilitate payments and discuss how this should be regulated. The authors argue that

developments in cryptocurrency provide another reason why Payment Systems regulation should be moved to a specialist regulator.

- **Attachment 4 – Chris Berg, Sinclair Davidson and Jason Potts, 'What Does the Blockchain mean for Government? Cryptocurrencies in the Australian Payments System, 2017.**

In this report, Dr Berg and Professors Davidson and Potts discuss the issue of integrating cryptocurrencies into the regulatory framework. Specifically, the authors argue that the UK's system of a dedicated payments regulator provides a model for the Australian government to manage the introduction of blockchain financial services and cryptocurrencies to the Australian payments system.

Section 1: The value of interchange to the market for payments

This section of the submission provides the Commission with detail about the value of interchange fees that could be added in the final report. This section explains that the case for government regulatory intervention is extremely weak and regulatory measures should be curtailed rather than expanded.

The Draft Report claims, among other things, that "there is little genuine commercial justification for interchange fees"[6] and that the "case for interchange fees is not strong."[7] On its face, the current draft commentary about interchange fees appears to suggest that financial exchange between consumers and producers should be banned unless the economic value can be proven to the regulator's satisfaction. In other words, heavy-handed regulatory intervention does not need to be justified – it is voluntary exchange that carries the burden of proof. It would be an incredibly worrying development for Australian policy if this proposition remained in the final report.

In the Draft Report, there is no clear analysis of why regulatory intervention on interchange fees is justified in the first place and there is also no systematic review of the Australian literature. Professors Davidson and Potts (2015a – Attachment A) provide a review in the attached report and our view is that the Commission should rely on this analysis. Further, the Draft Report recommends banning interchange fees when the Murray Financial System Inquiry (2015) and the RBA's Card Payment Systems Review (2016) did not reach this conclusion. The Draft Report does not specify any reasons for this departure.

In our view, it appears that the Commission has rushed to a conclusion without appreciating the role of interchange in the two-sided market. The distinctive features of a two-sided market are paramount for any economic analysis of interchange fees.

As a starting point, it is also important to be clear on what the interchange fee is. Specially, the merchant does not pay the interchange fee. The interchange fee moves from the acquiring bank to the issuing bank as a cost sharing mechanism that is part of a two-sided market. The payments system is an interdependent, interconnected ecosystem with four main parties: the cardholder/consumer, the merchant, the cardholder's bank (the "issuing bank"), and the merchant's

[6] Draft Report, p. 26.
[7] Draft Report, p. 299.

bank (the "acquiring bank"). The network (such as Visa and MasterCard) only plays a role between the issuing and acquiring bank. The networks set the interchange fees, but interchange fees are collected by the acquiring banks/processors that add a small fee—together with interchange, this is known as the merchant discount or merchant service charge. The interchange collected is then transmitted to the issuing bank. Interest and fees come primarily from consumers (including businesses who use cards for purchasing) and again are paid to the issuing bank. The issuing bank then pays the networks for the operation of the system, recovers its own costs and then hopefully has enough left over to make a profit. While the Draft Report correctly illustrates this relationship on Figure 10.3, there is commentary that appears to conflate the merchant's fees and the interchange fee.[8]

The strong case for the interchange fees rests on this two-sided market and the joint maximisation problem faced by credit card issuers – that is, how to maximise the number of consumers using their card as well as maximising the number of merchants willing to accept their card.

As Davidson and Potts (2015a – Attachment A, p. 6) explain,

> In most credit card systems, the interchange fee flows from the merchant side of the transaction towards the consumer side of the transaction. This implies that in some economies, consumers require more of an inducement to hold and use credit cards than merchants need to accept those cards. To argue that this relationship is somehow inefficient is to argue that consumers have monopoly power over merchants. While it is true that merchants are subject to consumer sovereignty, few economists, or policy makers would argue that consumers have monopoly power over merchants or, if they did, that this monopoly power should be restrained.

The interchange fee is a mechanism to share costs of the system. This can be seen on the face of the RBA's previous methodology for calculating interchange fee caps.[9] These costs include:

- The cost of processing credit card transactions, including receiving, verifying, reconciling and settling transactions;
- The cost of fraud protection and prevention for credit cards;
- The cost of authorising credit card transactions; and
- The cost of funding interest-rate periods on credit card transactions.

All these matters provide a benefit to both sides of the two-sided market. The interchange fee has emerged as a solution to sharing these costs in a competitive market. A more detailed discussion of these benefits as they relate to merchants is provided below.

The Draft Report asserts that merchants lack the ability to negotiate interchange fees. On the contrary, merchants around the world can — and do — directly negotiate with the networks to lower their interchange costs through a variety of incentive arrangements with networks, including deals in which the savings are rebated to the merchant. Merchants also understand the exact breakdown of the fees they will pay based on the agreement they each negotiated with their acquiring bank, including the interchange fee. Finally, it is important to note that even in countries

[8] See, e.g., Draft Report page 297.

[9] Reserve Bank of Australia, "*Payment Systems (Regulation) Act 1998* Variation of Interchange Standard as it applies to the MasterCard and Visa systems" Media Release, 2006. Available at: http://www.rba.gov.au/media-releases/2006/pdf/mr-06-02-creditcard-std.pdf

that do not have the same sort of interchange fee caps that Australia has, interchange fees have not been going up. The weighted average of interchange fees in the USA decreased between 2005 and 2010 (when caps on debit card fees were enacted), even with the significant advancements in technology, convenience, and new security and fraud protection measures — all advances that add significant value for merchants and consumers.

As Davidson and Potts (2015a – Attachment A, p. 8) summarise, while "it is correct to say that the interchange fee is not established in a spot market, but to argue that cardholders and merchants are not involved in overall price determination in a network is simply incorrect."

There are other benefits to merchants from interchange fees, when viewed as an incentive feature of a two-sided market. However, the Draft Report overemphasises the interchange fee costs to merchants without proper recognition of the corresponding benefits that interchange fees provide to the payment system. For instance, it must be recognised that interchange fees deliver significant benefits to merchants represented by an increase in sales, a guarantee of payment, and a shifting of the problem of credit risk to financial institutions. The ATA's submission to the RBA's Review of Card Payments Regulation provides a good summary of the merchant's benefits of credit card payments (footnotes omitted):

Larger purchases

Credit and debit cards were adopted in order to reduce the need for consumers to carry large amounts of cash around to make purchases, minimising the chances for loss or theft, and providing greater convenience for the merchant than checks. The consequence is that consumers are able to offer larger sums for purchases than they would otherwise be willing and merchants are more willing to accept them. This is borne out by research for the RBA, which suggests that credit card sales at large merchants are on average three times as big as cash-only transactions. The average cash payment in the sample was $27, compared with the average debit card payment of $66 and the average credit card payment of $83. This suggests that merchants' sales would suffer if consumers were discouraged from using credit and debit cards because of higher interchange fees.

Guaranteed payment

A significant benefit to merchants is that, if the charge is approved, they are paid for their goods or services by the card holder's bank regardless of whether or not the card holder had sufficient cash on-hand to pay for the goods or services in question. This guaranteed payment results itself results in higher sales. As Professor Todd Zywicki of George Mason University points out:

> For merchants that would not otherwise have operated their own credit systems, the bank guarantee facilitates transactions that would not otherwise have occurred because of the unavailability of credit. For small merchants (and consumers, of course) this benefit could be enormous, creating more product market competition and opening up entire new lines of business to entrepreneurs otherwise foreclosed from them. For these merchants, too, however, there is also a benefit from sales made (and profits earned) that would not otherwise have been made. Credit losses represent sales that, by definition, the consumer was unable to pay for, but for which credit was extended anyway.

This guarantee is a major reason why stores have shifted away from their own credit schemes to those offered by financial institutions. The interchange fee helps to pay for this guarantee.

The credit risk borne by the financial institutions is significant

The average transaction of $139 studied by the RBA included 78c in write offs and credit collections, meaning that for every $100 in transactions, 56c are written off as bad debts. For MasterCard and Visa transactions, the costs are higher, at 63c per $100. The RBA's current cap on interchange fees remains at 0.5c per transaction, which represents 50c per $100. The RBA does not allow these costs to be taken into account when calculating the costs of interchange fee regulations, but the cost is evidently higher than the revenue gained from the interchange fee for every transaction. In other words, despite all the other benefits provided by interchange fees, the interchange fee itself fails to cover the cost of one single element of the transaction – the credit risk. That risk is born by the financial institutions.

Indeed, according to RBA research, banks have written off around 3% of all credit card balances as losses in recent years (a figure that nearly reached 4% after the financial crisis). The approximate amount of debt outstanding and collecting interest rates on Australian credit cards has been around $33 billion for the past two years. Without the interchange fee, banks would almost certainly look to shift this risk back to the merchant. Either merchants would accept the risk and pay the cost, denting their bottom lines by more than the total they pay in interchange fees, or they would look to mitigate the risk by making less risky sales, again denting their bottom lines in lost sales while increasing policing costs.

Conclusion

In a free market economy, regulatory intervention must be based on clear, identifiable, theoretically sound and empirically proven market failures – not rhetoric. These have not been made out in the Draft Report and the commentary offered does not seem to recognise the genuine costs of operating a credit card payment system and the role of the interchange fee in a two-sided market. Instead, a monopoly explanation has been offered where no monopoly exists. Any case for regulatory intervention should be met with a response that is proportional and adapted to remedying the established market failure – not a heavy-handed response that would be worse than the failure itself.

The ATA relies on the conclusion of Davidson and Potts (2015a – Attachment A, p. 12) who found that:

> The RBA engaged in an extensive regulatory intervention based on poor theory and no empirical evidence. Theory has not provided an unambiguous indication of market failure, and there is no empirical evidence to support the notion of monopoly pricing – other than a vague notion that interchange fees are "excessive".

While it is true that merchants have benefited from the RBA's regulation of interchange fees, this was the whole point. However, this result has simply been a transfer from the consumers to the merchants with the effect that consumers are paying a greater share of the cost of the system. This point is dealt with in further detail in the next section of the submission.

Section 2: interchange regulation has been bad for consumers

The Draft Report claims that "The PSB caps on interchange fees have coincided with (and possibly contributed to) a reduction in merchant service fees over time."[10] The ATA's view is that the Commission must include the effect on consumers in its findings.

According to one analysis of the effect of the regulations on the Australian market, merchants were saving approximately $676 million annually as a result of reduced fees, meaning that they have saved approximately $10 billion since 2003.[11] The major beneficiaries of this appear to be very large merchants rather than smaller businesses. Such a redistribution was intended as one scholar explained, "The RBA's program is explicitly designed to improve the position of merchants."[12]

Multiple reports, however, express scepticism than the merchants' windfall was passed along to consumers. In its "Preliminary Conclusions" regarding the effects of its sweeping regulations, published in 2008, the RBA explained that "no concrete evidence has been presented to the [RBA] regarding the pass through of these savings."[13] That same year, the US Government Accountability Office issued a report following a study of the Australian reforms and concluded that here was **"no conclusive evidence" that merchants reduced prices for goods.**[14] And as late as 2015, the RBA admitted that it was "impossible . . . to measure exactly how these reductions in merchant service fees have flowed through into prices for consumers."[15] Rather, the RBA declare that it just "seems reasonable to assume that they have mostly flowed through to lower retail prices for customers."[16] The lack of analysis to back up this "reasonable assumption" is striking. As Davidson and Potts (2015a – Attachment A) note, "the RBA provides no reason why it would not be equally reasonable to assume that the [merchant fee reduction] flows mostly to the merchants' profit margins. Indeed, profit is something that is curiously missing from the entire RBA analysis."

In contrast to the vagueness regarding consumer benefits derived from the RBA's reforms, the costs that cardholders have experienced are clear. Evaluating the impacts of the RBA's reforms in 2008, one analysis found:

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[10] Draft Report, p. 298

[11] Robert Stillman, William Bishop, Kyla Malcolm, Nicole Hildebrandt: "Regulatory intervention in the payment card industry by the Reserve Bank of Australia"; CRA International, April 2008. p.13.

[12] Richard A. Epstein, *The Regulation of Interchange Fees: Australian Fine-Tuning Gone Awry*, 2005 Colum. Bus. L. Rev. 551, 554 (2005).

[13] Reserve Bank of Australia, *Reform of Australia's Payments System: Preliminary Conclusions of the 2007/08 Review*, p. 6 (Apr. 2008) Available at: https://tinyurl.com/yddxoqed

[14] U.S. Government Accountability Office, *Credit and Debit Cards: Federal Entities Are Taking Actions to Limit Their Interchange Fees, but Additional Revenue Collection Cost Savings May Exist* (May 2008) Available at: https://www.gao.gov/assets/280/275422.pdf *see also* Tr. at 4246:17-19.

[15] Reserve Bank of Australia, *Review of Card Payments Regulation: Issues Paper*, p. 23 (Mar. 2015) Available at: https://tinyurl.com/ybwfe65k

[16] Reserve Bank of Australia, *Review of Card Payments Regulation: Issues Paper*, p. 23 (Mar. 2015) Available at: https://tinyurl.com/ybwfe65k

> Cardholders are paying more for their cards. Between 2002 and 2008, the RBA estimates that **the average payment card fee rose by $40 per account**, indicating that (with 12 million accounts held in 2008) **cardholders are paying $480 million more to hold their cards than they did before the regulations took effect in 2003**.[17]

The analysis further concluded that "no evidence has been presented that would allow one to conclude that the undeniable losses to cardholders have been offset by reductions in retail prices or improvements in the quality of retail service."[18] The US GAO reached a similar conclusion, finding that "some costs for card users, such as annual and other fees, have increased" in the wake of the implementation of regulations like the removal of anti-steering rules.[19] Thus, independent analyses recognize that the gains merchants have experienced as a result of credit card regulation have not made their way to cardholders. The RBA itself admitted in 2012 that customers were paying more and receiving less, noting that "benefits earned from spending on credit cards have become less generous while annual fees to cardholders have increased."[20] The RBA reiterated this conclusion as recently as 2016, when it conceded that "the cap on the highest credit card rates, is likely to result in some reduction in the generosity of rewards programs on some premium cards."[21]

The RBA's interference in the credit card market continues to cause the reduction of rewards opportunities for customers, eliminating both choices and benefits for cardholders.[22] While the Draft Report does recognise that interchange fee regulation has reduced the value of credit card rewards programs, the Commission's draft recommendation would go further down the anti-competitive course charted by the RBA. Rewards programs should not be dismissed as being trivial. These programs are unquestionably valuable to consumers. Beyond that, reward programs also spur competition in the credit card market as card providers compete to provide the best reward packages to attract more consumers.

Finally, the issue of interchange fees must be clearly distinguished from the issue of surcharging. For example, the Draft Report notes that "Prior to recent reforms, the airline industry was able to impose customer surcharges on some fares far in excess of their cost of acceptance."[23]

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[17] Robert Stillman, William Bishop, Kyla Malcolm, Nicole Hildebrandt, *Regulatory Intervention in the Payment Card Industry by the Reserve Bank of Australia*, CRA International, p. 13.

[18] Robert Stillman, William Bishop, Kyla Malcolm, Nicole Hildebrandt, *Regulatory Intervention in the Payment Card Industry by the Reserve Bank of Australia*, CRA International, p. 33.

[19] U.S. Government Accountability Office, *Credit and Debit Cards: Federal Entities Are Taking Actions to Limit Their Interchange Fees, but Additional Revenue Collection Cost Savings May Exist* (May 2008) available at: https://www.gao.gov/assets/280/275422.pdf

[20] Iris Chan, Sophie Chong and Stephen Mitchell, *The Personal Credit Card Market in Australia: Pricing Over the Past Decade*, Reserve Bank of Australia, p. 55 (Mar. 2012)

[21] Reserve Bank of Australia, *Review of Card Payments Regulation: Conclusions Paper*, p. 47 (May 2016) available at: https://tinyurl.com/zk2d79u

[22] *See, e.g.*, Emily Cadman & Matthew Burgess, *Australians Wave Goodbye to Lavish Credit Card Perks*, Bloomberg (Mar. 13, 2017) available at: https://tinyurl.com/yaldgra6 ; Jan McCallum, *Change Is Coming to Credit Card Rewards Programs*, INTHEBLACK (May 15, 2017) available at: https://www.intheblack.com/articles/2017/05/15/change-coming-credit-card-rewards ; Chris Chamberlin, *Aussie Banks Rethink Credit Card Points, Fees Ahead of RBA Reform*, Australian Business Traveler (Jan. 12, 2017) available at: https://www.ausbt.com.au/aussie-banks-rethink-credit-card-points-fees-ahead-of-rba-reform

[23] Draft Report, p. 297.

While this may be true, the issue of surcharging has its origin in a 2003 decision by the RBA to eliminate no-surcharging rules in contracts. Australia now has a comical situation, where the government have legislated to fix the issue of excessive surcharging – a problem caused by a regulatory intervention in payments systems. There is now regulation on top of regulation, instead of the free-market position which dealt with the problem through private contracts. For further information on this issue, see Davidson and Potts' analysis attached to this submission (2015a – Attachment A).

Conclusion

The Draft Report's recommendation on interchange fees should not proceed because it would exacerbate the losses already suffered by consumers. Further regulation of interchange fees will have several negative effects that can already be foreseen. It will likely continue the process of shifting costs from merchants to consumers, not just increasing interest rates and fees, but also reducing interest-free periods and reward programs. All the evidence from all over the world suggests that further caps on interchange fees will increase fees and costs to consumers. This welfare cost will be particularly felt among marginal groups who cannot afford the full services of a bank account and rely on products like prepaid debit cards or payday loans. By contrast, the best course of action to maximise consumer welfare would be to recommend the removal of interchange fee regulation altogether.

Section 3: Competition and Innovation

Competition is a driver of innovation in the financial services sector, yet interchange fee regulation limits an important aspect of competition in the market. Premium cards are a positive thing for competitiveness within the Australian Financial System, and yet interchange fee regulation is targeted at eliminating these card offerings.

For example, the Draft Report notes that:

> The PSB's interchange fee caps appear to have improved competitive outcomes in card payments. First, they have contributed to the reduction in merchant service fees over time. Second, they have reduced the incentive for people to use credit cards for their rewards programs, thus making them more substitutable with lower-cost payment options, such as debit cards.[24]

Similarly, one of the reasons behind the most recent decision of the RBA to tighten interchange fee regulation was a desire to limit premium credit cards tied to reward and frequent flyer programs. The RBA was explicit about the effects that increasing interchange fee regulation would have, stating that:

> The reduction in interchange fees, especially the cap on the highest credit card rates, is likely to result in some reduction in the generosity of rewards programs on premium cards. It is likely, however, that there would be only limited changes to other elements of the credit card package (e.g. interest rates, interest-free periods).[25]

As our submission to the RBA observed, it seems that the view is that premium cards, with relatively higher interchange fee arrangements, are unnecessary. This substitutes a subjective value judgment for basic market function. Premium cards exist because the parties in the system—consumers, merchants and banks – find value in them. They would not exist if they did not increase net spend for merchants and provide value for consumers—this is true as well for merchant rewards programs that are not linked to credit. Competitiveness cannot be measured solely by the fees paid by merchants to acquiring banks. Such a narrow view fails to appreciate that interchange fees exist as part of a two-sided markets. In expressing a view about whether interchange fees are competitive from a merchant's point of view, the Draft Report has missed competition from the consumers' point of view – and proposed a recommendation which would worsen competition on the consumer side of the market.

Tightening interchange fees have removed credit card products from the Australian market. Prior to the RBA's 2016 changes, in Australia there were over 100 financial products linking credit cards to frequent flyer programs and credit cards. For instance, every major bank in Australia had a co-branded Qantas credit card. Virgin's Velocity was not far behind, with co-branded arranged with NAB and American Express, and direct arrangements with other banks' rewards schemes. These arrangements are a point of competitive difference, promoting competition and innovation in the financial sector. Consumers value these programs, as evidenced from the recent decision by Woolworths Ltd to reverse its decision to scrap its partnership with Qantas Frequent Flyer following

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[24] Draft Report, p. 299.

[25] Reserve Bank of Australia, *Review of Card Payments Regulation: Issues Paper*, p. 38 (Mar. 2015) Available at: https://tinyurl.com/ybwfe65k

an intense consumer backlash.[26] Following the RBA's 2016 regulations, the co-branded arrangements have disappeared, fees have increased, and rewards programs have been slashed – according to the card schemes, this was a direct result of the regulatory changes.[27] Again, these regulatory actions have been anti-competitive – and should be removed entirely. Regulators should not have the power to micro-manage which cards consumers have access to. Such interference in a highly competitive market is simply unjustifiable in a liberal, market-based economy.

The Draft Report does touch on the issue of co-branded or companion cards, stating that a justification for the complete ban of interchange fees is that "continued regulation of the level and range of the interchange fee is likely to lead to further regulatory gaming, as was observed with the companion card schemes."[28] Companion cards were a positive development for both sides of the market – and tighter interchange regulation has led to banks no longer offering those products, as observed above. In response to the RBA's 2016 consultation paper, the ATA expressed a strong preference for removing regulation of interchange fees for four-party schemes. This was because there is a competitive neutrality issue. It is an unintended consequence of interchange regulation that four-party card schemes do not compete on an equal footing with three party card schemes. Because it is a problem caused by regulation, the only way to permanently fix the problem is to remove the regulation. In other words, the only way to ensure that all card schemes are subject to the same rules is by removing interchange fees altogether.

Another competitive neutrality issue is in relation to BPAY. As the Draft Report explains,

> BPAY members are required to pay fees, including processing costs, membership fees and a wholesale fee called the 'Capture Reimbursement Fee' (CRF). The CRF is equivalent to an interchange fee to be paid by the biller's financial institution to the sender's institution. These fees are generally recouped through merchant service fees. In 2005, and again in 2007, the PSB examined the case for regulating BPAY's CRF. The PSB expected that regulating the CRF would reduce the merchant service fees associated with BPAY, but lead to an increase in the price charged to consumers. Therefore, no regulation was ultimately imposed.[29]

It is curious that the Draft Report's position of the interchange fee is entirely inconsistent with the position taken on the CRF. Regulating the interchange fee has increased costs of the system carried by consumers. Again, the only way to put credit card payments on an even competitive footing is to deregulate interchange fees.

The Draft Report does not specify what other 'gaming' of regulation the Commission foresees – and it would be helpful if the Commission could identify this so that a further response could be made.

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[26] "Woolworths brings back Qantas frequent flyer points for shoppers", Australian Business Traveler, 15 December 2015: http://www.ausbt.com.au/woolworths-brings-back-qantas-frequent-flyer-points-for-shoppers

[27] See, e.g., "How the interchange cap will affect credit card frequent flyer points", Australian Business Traveler, 30 May 2016: https://www.ausbt.com.au/how-the-interchange-cap-will-affect-credit-card-frequent-flyer-points; "ANZ removes American Express companion cards: moves to Visa only with increases to Visa earn rates & addition of points caps", Point Hacks, 1 March 2017, https://www.pointhacks.com.au/anz-changes-2017

[28] Draft Report, p. 299.

[29] Draft Report, p. 282.

Nevertheless, the problem of regulatory gaining will only be eliminated if the regulation is eliminated – not if further regulation is put in place.

Lastly, interchange fees contribute heavily to the funding of innovation, which is the gateway for future competition in the payment systems market. Lower interchange fees reduce incentives to innovate – slowing future competitive pressures.

We know that the payments market is a fast-moving one with continuous innovation. Not only do security procedures have to be continually updated and reformed but also new forms of more convenient payment are being introduced all the time. For example, the contactless payment system known as "Tap n Go" has been a huge success in Australia, with over 28 million payments per month using Visa PayWave as of February 2014.[30] Lower revenue from interchange fees reduces incentives for financial institutions to develop innovative and convenient products that encourage more use of cards and will instead focus on products that deliver more interest rate or fee income.

Such innovation does not occur without an incentive to promote it, and interchange fees have generally been that incentive in the past. The rise of Apple Pay in the USA compared to Australia is a case in point. As Andrew Cornell of ANZ Banking Group notes,

> Apple Pay, the highest profile new player in payments, has taken off in the US but barely anywhere else. One theory is because interchange rates in the US are high enough – more than double Australia - that banks can offer Apple a clip of the deal, encouraging Apple to take a greater role in shifting payments on to bank systems and networks such as Visa and MasterCard through the use of Apple Pay.[31]

Indeed, the RBA has recognised the role of interchange fees in innovation. In 2015 it stated that:

> Interchange arrangements in the card systems will also affect the nature of new payment arrangements that are adopted by the payments industry. In particular, a more efficient and lower-cost new payment system might be hampered in its development to the extent that it had to match existing interchange payments to card issuing institutions to ensure the participation of banks in the new system.[32]

Without the incentive of revenue from interchange fees, financial institutions will have less reason to develop innovative and convenient products that encourage more use of cards and will instead focus on products that deliver more interest rate or fee income.

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[30] "Australia hooked on tap and go payments: Visa PayWave," News.com.au, February 9 2014. http://www.news.com.au/finance/money/australia-hooked-on-tap-and-go-payments-visa-paywave/story-e6frfmci-1226821426268

[31] Andrew Cornell: "The RBA must put a price on innovation"; ANZ BlueNotes, 4 May 2015. https://bluenotes.anz.com/posts/2015/05/how-do-you-pay-for-paymentsinnovation

[32] Reserve Bank of Australia, "Review of Card Payments Regulation – Issues Paper," March 2015, p.1. http://www.rba.gov.au/payments-system/reforms/review-of-card-payments-regulation/pdf/review-of-cardpayments-regulation-issues-paper.pdf

Section 4: The case for a specialist regulator

The main reason that the RBA is the payment systems regulator is largely historical. However, this regulatory function is entirely different from its function in conducting monetary policy as central bank.

The payments system exists in the domain of competition and regulatory policy, which has distinct principles, models and objectives to monetary policy. It also calls upon different expertise. Davidson and Potts (2015b – Attachment B, pp. 10-11) explain that this requires different expertise within the broader field of economics.

> The economics of industry regulation – of any industry, including financial ones, such as the payments system – is a very different branch of economic theory and practice. First, it is entirely based in microeconomic theory (not macroeconomics) and is focused on market behaviour under different degrees of competition (from perfect competition to monopoly) … Regulation of the payments system rules, including the bank interchange fee, is an issue of industrial organization and competition policy. This is not the RBAs natural domain of competence. Instead, the RBA has a comparative advantage in monetary policy. Australian financial industry would be better served if payments regulation were handed off to a more specialized agency.

The RBA's lack of transparency is another feature that renders it an inappropriate and undesirable regulator of our payments system. As Davidson and Potts (2015b – Attachment B) continue to explain the differences between competition and regulatory policy and monetary policy functions.

> The objective of monetary a policy is macro financial and price stability – as a public good. But payments system regulation is about promoting efficiency and competition, in order to drive out waste and encourage innovation. This is an economizing objective – to promote the efficient use of society's resources. These different objectives have completely different pathways of effect, and completely different measures of success. There is no overlap in the practical prosecution of the tasks of monetary policy and industrial regulation.
>
> It is certainly not inconceivable that a single government agency can have multiple unrelated tasks based on distinct specialist functions. The Australian Defence Force, for example, both trains soldiers (a task focused about mental and physical education) and maintains materiel (a task focused about logistics and engineering). But these largely unrelated functions are gathered within a single organization for a compelling reason, namely that they are conjoint inputs in providing the service of security and defence. But this argument does not hold for RBA joint control of monetary policy and the regulation of the payments system. Regulatory control of the payments system is not a necessary coinput into achieving effective monetary policy or in the conduct of open market operations.
>
> These two bodies of knowledge and experience [monetary policy and competition regulation policy] can of course be combined in the same agency, but they must reside in different people, and different teams, with different cultures. There is little gain to be had from aggregation, and much mischief to be made from running the two together. An obvious problem with the RBA and its two separate boards is that the same person – the RBA Governor – is chair of both.
>
> A more serious issue is the transparency of the RBA's Payments Board. This is a non-minuted society. Its decisions are completely non-transparent. This governance model is for very good reason with respect to monetary policy – namely to ensure effective independence and time consistency. But

> there is no basic in logic or experience to argue that this secrecy and unaccountability is appropriate for a competition regulator.

Furthermore, the RBA lacks the specialised and technical competency necessary to regulate Australia's payments system in an era characterised by innovative technological developments such as crypto-currencies including bitcoin. These currencies and platforms are likely to pay a vital role in transforming and improving efficiencies and utility within our payments system. This has been recognised by the Australian government's Treasury Financial Systems Inquiry.[33]

Currently, the RBA maintains that digital currencies do not yet raise significant concerns pertaining to competition, efficiency or risk to the financial system and these currencies are not regulated by the RBA or subject to regulatory oversight.[34]

The lack of regulatory oversight pertaining to these currencies is a positive development as it fosters 'permissionless innovation' that ensures development and innovation unstifled by government overreach as entrepreneurs are able to develop, expand and evolve technologies and products within a flexible environment.[35] This notion and the need for a 'wait and see' approach to potential oversight of new technologies has been recognised by the Productivity Commission, which found that regulation may have 'unrealised risks.'[36] The Treasury Financial Systems Inquiry similarly found that such a 'graduated regulation' approach to digital currencies is expected to improve consumer outcomes overall.[37]

However, regardless of the current stance of these institutions, the RBA will have authority to designate and regulate digital currencies should they decide that digital currencies and blockchain applications represent a stability issue, or once these currencies take a greater role in our payments system.[38]

Given the current federal government's stated mandate to foster innovation in the economy through policy that allows Australia to take full advantage of disruptive and rapidly evolving technology,[39] it is vital that any future regulation of this emerging technology deemed necessary is performed by a specialist regulator rather than the RBA.

Potts and MacDonald (2016 – Attachment C, p. 30) conclude that a specialist regulatory body is required.

> Payments is a fast moving technological space, and the burgeoning development of cryptocurrencies, such as bitcoin, does much more than just introduce electronic money into an existing payments system. Because blockchain platforms such as Ethereum can be used to embed smart contracts (among other features, such as multisig transactions and decentralised autonomous organisations)

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[33] The Australian Government the Treasury, *Financial System Inquiry: Final report*, November 2014, p. 166.
[34] Reserve Bank of Australia, Submission 19, p. 9; Dr Anthony Richards, Reserve Bank of Australia, *Committee Hansard*, 7 April 2015, p. 45.
[35] Adam Thierer. Permissionless Innovation: The Continuing Case for Comprehensive Technological Freedom. Mercatus Centre, George Mason University: 2014.
[36] Productivity Commission. (2016). Digital Disruption: What Do Governments Need To Do? Available online: http://www.pc.gov.au/research/completed/digital-disruption
[37] The Australian Government the Treasury, *Financial System Inquiry: Final report*, November 2014, p. 146.
[38] Mr Christopher Hamilton, Australian Payments Clearing House, *Committee Hansard*, 7 April 2015, p. 7.
[39] Simon Thomsen, "Turnbull's vision for Australia: 'Disruption is our Friend' *Business Insider,* September 15, 2015. https://www.businessinsider.com.au/malcolm-turnbull-disruption-is-our-friend-2015-9

> into the payments ecosystem, the governance and regulation of payments platforms becomes inseparable from the underlying code or technology. Code is law, as Laurence Lessig put it. The regulatory role cannot stand outside the design and implementation of the technology, thus requiring specialised competence. As a specialist in monetary policy, the RBA does not have, nor should it have, these technical capabilities in code development or platform design. The Payments System Board was never well-placed within the Reserve Bank of Australia because of the very different specialisations.

The necessity of a specialist regulator for distinct functions also has precedent in Australia as in the case of the Australian Prudential Regulatory Authority (APRA)'s creation. Berg, Davidson and Potts (2017 – Attachment D) observe that

> The creation of the Australian Prudential Regulatory Authority in 1998 was driven by the recognition that the task of central banking and the task of financial regulation are distinct and can create conflicts of interest as single authorities try to balance the needs of one of its mandates against the other.

The United Kingdom offers us the benefit of a regulatory model for specialised payment system regulation that is informed by international experience, as Berg, Davidson and Potts (2017 – Attachment D, pp. 26-27) make clear.

> The UK's *Financial Services (Banking Reform) Act 2013* created a new independent regulator for payments, Payment System Regulator (PSR). Until the 2013 legislation, payments regulation was governed largely by the Bank of England and the Financial Services Authority. The UK Treasury was empowered to designate a system as a regulated ('recognised') payment system. In addition the Payments Council existed as a self-regulatory body for firms involved in the payments system. In 2009 the Payments Council announced that cheques were to be phased out in a decade. Controversy surrounding this decision (which was reversed) led to a series of reviews that culminated in the 2013 reforms.
>
> The 2013 reforms established the PSR as an independent body subsidiary to the Financial Conduct Authority. The PSR has its own statutory objectives and PSR board. The chair of the board is also the chair of the Financial Conduct Authority. The PSR is funded by a levy on the regulated payments firms. The industrial representation embodied by the former Payments Council is included in the Payment Systems Regulator Panel. This body is established by statute as an advisory panel, and takes positions that are independent of the PSR.
>
> The United Kingdom provides a model for payments system regulation in Australia. It provides more legitimacy than the current arrangement: interchange fee regulation in particularly is a form of regulatory taxation, and ought not to be the province of the central bank. Vesting payments regulation in a dedicated regulatory authority would encourage greater regulatory expertise.

Recommendations and Conclusion

In conclusion, the Australian Taxpayers' Alliance urges the Commission to undertake a complete redraft of sections of the Draft Report regarding interchange fees.

The ATA recommends that:

(1) Recommendation 10.3 be deleted from the Draft Report and replaced with a recommendation that "The Payments Systems Board should repeal all Standards capping interchange fees by mid-2019."
(2) The Commission should additionally recommend that a specialist regulator is established to regulate payment systems, as opposed to the present system of the Payment Systems Board operating under the Reserve Bank of Australia.
In the alternative, the ATA recommends that:
(3) The Commission remove all commentary and recommendations about interchange fees and defer consideration of this issue to a separate inquiry.

Attachment 1

AUSTRALIAN INTERCHANGE FEE REGULATION

a regulation in search of market failure

About the Authors

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Executive Summary

The Reserve Bank of Australia has been a world leader in interchange fee regulation. In this paper we suggest that this regulatory intervention has been based on wishful thinking at best and represents a failure to understand the actual working of the market economy.

In short, the Reserve Bank of Australia engaged in an extensive regulatory intervention based on poor theory, and no empirical evidence. Theory has not provided an unambiguous indication of market failure, and there is no empirical evidence to support the notion of monopoly pricing – other than a vague notion that interchange fees were "excessive". What the Reserve Bank identified as being "externality" any fair minded observer would label "gains from trade".

We argue that interchange fees are the outcome of an efficient bargaining process given that banks and consumers, and banks and merchants form long term relationships with each other. For as long as there is competition in the banking sector and competition in the retail sector, the interchange fee itself is subject to competitive pressure.

There is no market failure and no economic justification for government intervention. The $13 billion "saving" to merchants that the Reserve Bank identifies following its regulatory reform is simply a redistribution away from consumers (and banks) towards merchants. The Reserve Bank assumes that the saving has been passed onto consumers, but cannot provide any evidence to support that hypothesis.

It is not at all clear that consumers have benefited from interchange fee regulation. To the contrary is likely that consumers are worse off – while merchant fees have declined, so too have the benefits of using credits while the costs (including the interest rate premium over the cash) have increased.

1. Introduction

Ronald Coase famously argued that "if an economist finds something – a business practice of one sort or other – that he does not understand, he looks for a monopoly explanation".[1] So it is with credit card interchange fees. As we will demonstrate intellectual confusion has lead to the phenomenon of interchange fees being misdiagnosed as being a monopoly problem leading to inappropriate policy intervention. Following George Stigler's path breaking analysis of the US Security and Exchange Commission he claimed that financial regulation was "founded upon prejudice and … reforms are directed by wishfulness".[2] In our opinion, Australian regulation of interchange fees should be placed into the same category: reforms initiated by ignorance and anti-bank prejudice.

A 2000 joint study by the Reserve Bank and Australian Consumer and Competition Commission concluded *inter alia*:[3, 4]

II Credit card interchange fees are significantly above levels suggested by cost-based methodologies and contribute to margins of revenues over average costs of around 39 per cent for card issuers. …

IV 'No surcharge' rules in credit card schemes prevent purchasers from confronting the cost of this payment instrument vis-à-vis lower cost payment instruments such as debit cards. It means that other consumers subsidise credit cardholders and financial institutions which are card scheme members. An alternative arrangement would have merchants exercising discretion to charge customers prices that are net of the cost of the payment instrument, and add a surcharge to cover that cost.

V Competition in credit card issuing and acquiring is limited by restrictions on access to credit card schemes. Excluding all institutions other than authorised deposit-takers from access to acquiring, in particular, is difficult to justify on risk grounds.

…

Interchange fees are set by card issuers and acquirers at 'one step removed' from the cardholders and merchants who ultimately bear these fees through transaction charges or through the general cost of goods and services. Users therefore do not have a direct influence on the pricing of card payment services but must rely on their financial institutions to represent their interests. As a consequence, the price signals and competitive responses that would be expected to put pressure on margins in card payment networks have not worked effectively. These difficulties are reinforced by restrictions on access to the card networks, both explicit and informal, and by the 'no surcharge' rules in credit card schemes.

The regulatory concerns then relate to excessive pricing, price fixing, abuse of market power, the creation of barriers to entry, increased consumers prices generally, and excessive use of credit cards relative to alternate payment methods. The fact that end-users do not observe the interchange fee

[1] Coase, 1972 [1988], pg. 67.
[2] Stigler, 1964, pg. 142.
[3] Reserve Bank and Australian Consumer and Competition Commission, 2000, pg. 73 – 74.
[4] Hereinafter RBA – ACCC.

makes it opaque, and less prone to competitive pressure. All these arguments suggest that regulatory intervention can easily correct these apparent market flaws and result in improve economic performance.

As a result of these concerns and the apparent ease at which corrective action could be undertaken Australia embarked on a program of regulatory intervention. In this paper, we argue that the regulatory concerns were over-sold and rely on a faulty understanding of the underlying economic principles. There is no case for intervention.

The remainder of the paper is set out as follows. In section 2 we explain what an interchange fee is. In section three we critique the Australian arguments for regulatory intervention and show data as to consequences of that intervention. In section 4 we provide alternative, non-monopoly but efficiency enhancing, explanations for interchange fees.

2. What is an interchange fee?

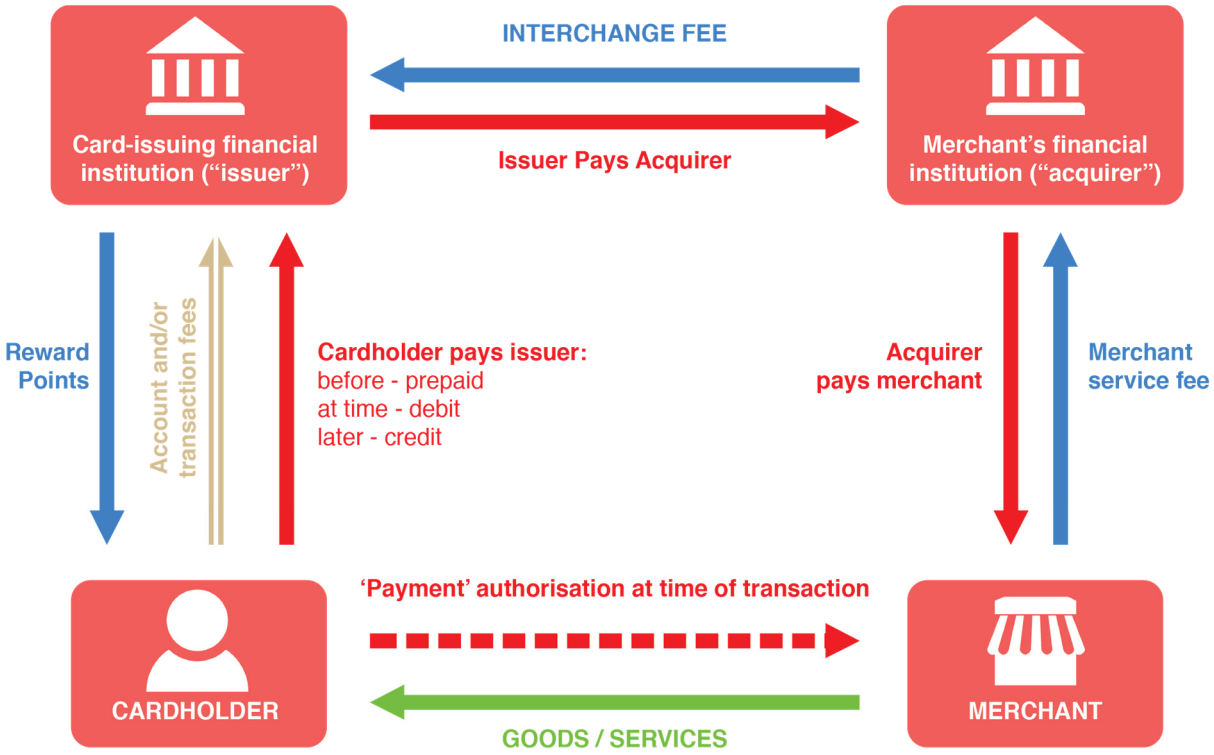
Interchange fees are fees that banks charge each other as a result of their respective clients entering into a credit card transaction. Figure 1 below shows how the Reserve Bank of Australia depicts an interchange fee. The figure shows a stylised (four-party system) example of transactions involving a credit card.

The consumer (cardholder) purchases goods and services from a merchant and pays for the goods and service using a credit card. Underpinning that particular transaction is two prior transactions and a long-term relationship. The first prior transaction is between the consumer and their own financial institution whereby they acquire a credit card and pay a fee for the credit card use. As part of that transaction the consumer may or may not earn reward points as a function of the credit card usage. The second prior transaction is between the merchant and their financial institution whereby the merchant pays a fee to their financial institution in order to process credit card payments. The long-term relationship is between the two financial institutions that provide financial services to the consumer and merchant.

When the merchant sells goods and services to the consumer, the consumer authorises his financial institution to pay a sum of money to the merchant. The merchant passes the authorisation to his financial institution which then collects the money from the consumer's financial institution and pays the merchant. Finally the consumer's financial institution gets paid once the consumer pays off their outstanding credit card balance.[5]

[5] What is missing from the Reserve Bank explanation is that the consumer's bank as extended credit to the consumer while immediately paying the merchant's bank. The risk of non-payment is borne by the consumer's bank.

Figure 1: RBA depiction of an interchange fee



Source: RBA 2015, pg. 6

The interchange fee is a fee paid by the merchant's bank to the consumer's bank.

Neoclassical economists describe this type of arrangement as being a "two-sided" market. Two-sided markets consist of two sets of end-users who have their needs met simultaneously. In this case the credit card example the two sets of users include consumers who use the credit (card holders) and merchants who accept the card. The card itself is useless if either consumers will not use the card, or merchants will not accept the card in payment. Credit card companies, or associations, have a joint maximisation problem: maximising the number of consumers who will use the card and maximising the number of merchants that will accept the card. The incentives facing consumers and merchants being somewhat different Hayashi and Weiner argue that the interchange fee "an instrument that networks can use to achieve a desired balance of cardholder usage versus merchant acceptance across the two sides of the market … In other words, interchange fees are a mechanism that can be used to transfer revenues from one side of the market to the other to generate the desired level of card activity."

There are two issues of importance.

- The direction the interchange fee flows in.
- The magnitude of the interchange fee.

In most credit card systems the interchange fee flows from the merchant side of the transaction towards the consumer side of the transaction.[6] This implies that in some economies consumers require more of an inducement to hold and use credit cards than merchants need to accept those cards. To argue that this relationship is somehow inefficient is to argue that consumers have monopoly power over merchants. While it is true that merchants are subject to consumer sovereignty few economists, or policy makers, would argue that consumers have monopoly power over merchants, or if they did that this monopoly power should be restrained.

There is a rich *academic theoretical* literature that considers the magnitude of the interchange fee. In their 2006 survey paper, Hayashi and Weiner categorise the theoretical literature into one of four categories.

1. Assumptions about the (credit card) networks. Are the networks themselves competitive, or monopolies?
2. Assumptions about financial institutions. Are financial institutions competitive or monopolies?
3. Assumptions about consumers and merchants. Do merchants have monopoly power? Do consumers have single cards or multiple cards?
4. Other factors that might be important. What network rules are in place? No-surcharge rules? Honour all card rules?

Recall that the regulatory concern relating to credit card interchange fees is that the fees themselves were opaque, excessive, and encouraged excessive usage of credit cards relative to other payments mechanisms.

With a rich theoretical literature, including contributions from the 2014 economics laureate Jean Tirole, we might expect that clear unambiguous theoretical results could inform real world observations and shed light on the need, if any, for regulatory intervention. That, however, is not the case. For example, Katz (2001) reports that monopolistic networks with no-surcharge rules and reward points will result in excessive credit card use. That result appears to be consistent with the regulatory concerns. But credit card networks are not monopolistic. Studies that assume competitive networks have conflicting results. Rochet and Tirole (2002) show that if networks are competitive and consumers hold more than one card that interchange fees are not affected. But if consumers do not hold more than one card that merchants reduce acceptance of cards and interchange fees fall. In the same paper, however, they also show that even if networks are monopolistic as long as financial institutions are competitive (in issuing credit cards) that interchange fees will fall. Several other papers show similar mixed results. Interchange fees may either be higher or lower depending on the assumptions made in the analysis.

Importantly for our purposes, changing assumptions about network rules such as the no-surcharge rule or honour all cards rule has differing results. Again interchange fees could be higher or lower depends on a host of other factors or assumptions being made in the analysis.

[6] This is not always the case. In some markets the interchange fee has gone from the consumer side of the transaction to the merchant side, and in some economies the interchange fee is zero.

After an extensive survey of the literature Hayashi and Weiner conclude:[7]

What one comes away with after surveying this rich theoretical literature is an appreciation for the many factors that may affect interchange fees. Even a single factor may impact interchange fees differently, depending on other factors. Determining the actual impact of such variables is, in the end, an empirical question.

What that implies is that the theoretical results are not robust to changes in the underlying assumptions in the modelling. The 1990 economics laureate Merton Miller has claimed that there is nothing more practical than good theory. By that benchmark the theoretical analysis of interchange fees is simply not good theory as it give no practical guidance to what we might expect to observe in the real world.

In a 2003 paper Rochet and Tirole had come to the same conclusion, summarising the theoretical academic literature as follows:[8]

On the contrary, recent academic work concurs to establishing that there is no systematic bias in the IFs selected by cooperative networks: there is no reason to think that privately optimal IFs are higher or lower than socially optimal ones. Misunderstanding the economics of the problem and imposing cost-based regulation could impose substantial distortions in the industry.

They are even more damning that Hayashi and Weiner. Rochet and Tirole claim, quite correctly as we will argue below, that the very nature of the economic problem at hand has been misunderstood.

3. The Australian literature

Rochet and Tirole establish the basis for public intervention in markets as being a two-fold process:[9]

> The standard approach to public intervention in industries involves two steps:
>
> (1) the theoretical identification of a serious market failure and the validation of its empirical relevance,
>
> (2) the identification of the least distortionary way of addressing the market failure and a check that the remedy will not be worse than the illness.

As we have shown above, the very first step of that process has not been achieved. There is no theoretical basis for regulation of interchange fees. Rochet and Tirole are clear – the problem is a misunderstanding of the economics. In this section we highlight those misunderstandings in the Australian literature.

[7] Hayashi and Weiner, 2006, pg. 88.
[8] Rochet and Tirole, 2003, pg. 71.
[9] Rochet and Tirole, 2003, pg. 70.

The Australian literature on interchange fees consists of a joint report by the RBA – ACCC, a series of papers by Joshua Gans and Stephen King[10], and a more recent 2015 Reserve Bank of Australia Issues paper. In this section, we mostly focus our attention on the work undertaken by the Reserve Bank.

The RBA – ACCC report provides a description of credit card networks as per figure 1. It then describes how networks provide benefits to users (both consumers and merchants) as they increase in size i.e. more consumers hold a particular card and/or more merchants accept that particular card. Rather than considering an increase in network size as an increase in the size of the market and therefore any benefits flowing from that increase as being the gains from trade, the RBA – ACCC report instead views the benefits as being an externality.[11] This, in our opinion, constitutes a methodological error. Gains from trade constitute a benefit of the market mechanism, while externalities arise from market failure.

In this particular case the argument is that a network can generate positive externalities for users (suggesting that it should increase in size), but negative externalities for non-users (suggesting that networks can become too big). This possibility occurs if and when the merchant has monopoly power and can pass their service fees (including the interchange fee, see figure 2 below) onto consumers. At this point the interchange fee could be increased and result in greater private benefits to cardholders but higher prices to non-card holders. Given a somewhat non-standard definition of efficiency, "A payment network is said to operate efficiently if the net benefits it provides to society are being maximised", the RBA – ACCC study is able to argue that credit card networks may be too large in Australia. [12] Definitions of efficiency would normally suggest that an institution or process was meeting stated objectives at least possible cost. The argument here results in the proposition that increased competition to expand the network could result in increasing prices if merchants have some monopoly power.

The problem being exacerbated, the RBA – ACCC claim, by the fact that cardholders and merchants "are not involved in determining the interchange fee".[13] As we argue below, that statement is not strictly speaking true. It is correct to say that the interchange fee is not established in a spot market, but to argue that cardholders and merchants are not involved in overall price determination in a network is simply incorrect.

Nonetheless in the early 2000s Australia embarked on a series of regulatory interventions. The Reserve Bank of Australia announced its intention to introduce a series of reforms in August 2002. See table 1 for a time-line of reforms.[14]

Hayashi and Weiner are blunt in their assessment of the literature and regulation in Australia: "None of the models appears to closely fir the Australian market over a large number of parameters".[15] In other words there is no theoretical basis to support the introduction of regulation in Australia.

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[10] Gans and King, 2001, 2002, 2003a, 2003b, 2003c.
[11] RBA – ACCC, 2000, pg. 24.
[12] RBA – ACCC, 2000, pg. 27.
[13] RBA – ACCC, 2000, pg. 28.
[14] In this paper we are primarily interested in credit card interchange fees, but include other reforms for completeness.
[15] Hayashi and Weiner, 2006, pg. 100.

Table 1: A time line of payment reforms

Date	Reform
October 200	Joint RBA – ACCC study published
December 2001	RBA consultation document released
August 2002	Intention to reform announced
January 2003	No Surcharge Rule eliminated
July 2003	Interchange fees capped
January 2004	Access regime modified
February 2004	Debit card reform (Visa)
September 2004	Debit card reform (MasterCard)
April 2006	Debit card reforms announced
July 2006	Debit card reforms implemented
November 2006	Common cost-based Interchange fee Benchmark introduced
January 2007	Honour all card rule abolished

Source: Authors, RBA 2015

Two Australian academics, Joshua Gans (now at Toronto University) and Stephen King (now at Monash University) have published a series of theoretical papers looking at interchange fees and regulatory concerns in credit card markets. It is fair to say that their views, while in favour of regulation, are nuanced. Overall their view is that the no-surcharge rule should be eliminated and as a result the interchange fee would become irrelevant. There is no need then to both eliminate the no-surcharge rule and regulate interchange fees.

The Gans and King analysis is predicated on resolving what they refer to as being "the inefficiency". They define an efficient transaction as follows:[16]

If a credit card transaction was efficient then it would probably be implemented if the customer and merchant as joint consumers and the issuer and acquirer as joint suppliers all negotiated over that transaction.

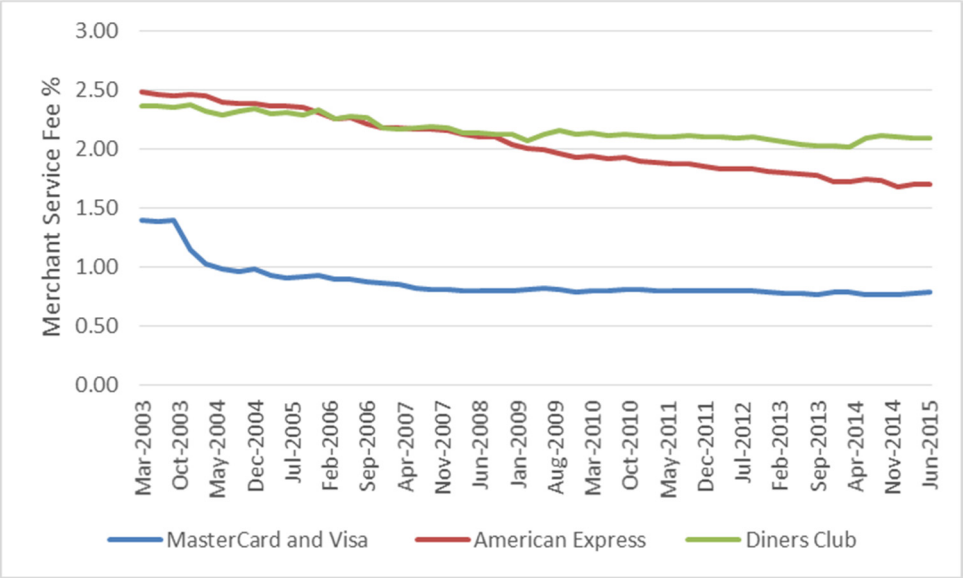
They refer to this description of a transaction as being Coasian bargaining after the economics laureate Ronald Coase.[17] They are making, at least, two errors at this point. First they are characterising only spot market transactions as possibly being efficient. Second they are ignoring the efficiency gains that can come about by entering into long-term relationships. We discuss this in greater detail in the next section. For our purposes here it is important to note that *the* inefficiency that Gans and King analyse is *an assumption based on a methodological error*.

They then canvass three possible "solutions" to their "inefficiency". The first solution involves horizontal integration – the two financial institutions merge into one (converting a four party credit card system into a three party credit card system). This is how American Express and Diner's Club are organised. In practice, however, the costs associated with those two providers tend to be higher than those

[16] Gans and King, 2001, pg. 99.
[17] This, of course, is a (common) mischaracterisation of Coase 1960.

associated with four-party systems (see exhibit 1). Alternatively a no-surcharge rule could resolve the inefficiency, or the existence of interchange fees could resolve the inefficiency.

Exhibit 1: Merchant Service Fees across four-party systems and three-party systems



Source: RBA Statistics

Gans and King are of the opinion that in the absence of a no-surcharge rule that interchange fees are competitively neutral.[18] The RBA – ACCC was concerned that excessively high interchange fees would distort consumer preferences towards excessive usage of credit cards relative to other payment mechanisms. A consequence of this possibility is that cash paying consumers pay too much for their goods and services and effectively "cross-subsidise" credit card paying consumers. Rather than have regulators set prices, Gans and King prefer regulators to eliminate the no-surcharge rule allowing merchants to charge differential prices (if the market will bear a price differential) depending on payment mechanism. They sum up:[19]

In the absence of a no surcharge rule, cooperative setting of interchange fees cannot have any anticompetitive effect.

Even in the presence of a no surcharge rule, the setting of interchange fees only creates competitive concerns if there is inadequate retail level competition.

Overall Gans and King consider the no-surcharge rule and the interchange fee as substitutes and argue that eliminating the no-surcharge rule makes regulating the interchange fee redundant. Overall, they doubted that the RBA interventions would result in many benefits.[20]

[18] Gans and King 2003a.
[19] Gans and King, 2003a, pg. 39.
[20] Gans and King, 2003c, pg. 472.

In summary, our analysis casts doubt on the benefits that will be created by the RBA's credit card reforms. While allowing surcharging makes sense, it is not certain that the regulated approach to interchange fees adopted by the RBA will lead to lower costs of transacting.

While we believe the Gans and King analyses are methodologically flawed it is interesting to note that they argue the interchange is competitively neutral. Of course, the RBA does not agree with assessment.

The RBA 2015 issues paper seems to suggest that its regulatory interventions are been successful. It restates unproven regulatory concerns as having been fact. For example,[21]

Competition between the schemes had, if anything, created upward – not downward – pressure on these fees. The higher the interchange fee paid to card issuers, the greater their incentive to issue the cards of a scheme and the larger the subsidies that can be paid to cardholders to encourage use of those cards. At least up to some limit, merchants appear unable to resist the high merchant service fees that result, typically finding it difficult to decline acceptance of cards given the risk of losing sales.

Whether or not competition resulted in increased interchange fees and increased merchant service fees (resulting in downward pressure on merchant profit margins) is an empirical question. If the evidence to validate that view exists, it is not in the public domain. It is true that interchange fee regulation did lead to a decline in merchant services fees, but as the RBA admits:[22]

*It is **impossible** – given the imprecision in any econometric model of consumer price inflation – **to measure exactly** how these reductions in merchant service fees have flowed through into prices for consumers.*

The RBA do report, however, that the reduction in merchant service fees since the regulatory intervention has been some $13 billion. They assume that those "savings" have been passed onto consumers claiming, "it seems reasonable to assume that they have mostly flowed through to lower retail prices for consumers".[23] Yet the RBA provides no reason why it would not be equally reasonable to assume that the $13 billion flows mostly to the merchants' profit margins. Indeed profit is something that is curiously missing from the entire RBA analysis.

We are told, for example, "competition in well-established payment card networks can lead to the perverse result of increasing the price of payment services to merchants (and thereby leading to higher retail prices for consumers)".[24] It simply never occurs to the RBA that, alternatively, increased costs to merchants could result in reduced profit margins. Much the same as the economic incidence of taxation is determined by the market, so too the economic incidence of costs is determined by the market.

It is important to note that the $13 billion is not a saving to the economy. It is simply a redistribution. If that money had been paid in interchange fees it would have been shared between consumers, in the

[21] RBA, 2015, pg. 4.
[22] RBA, 2015, pg. 23 (emphasis added).
[23] RBA, 2015, pg. 23.
[24] RBA, 2015, pg. 7.

form of reduced fees and loyalty programs, and their financial institutions. At best the RBA argument is that the $13 billion is being shared by merchants and consumers.

In addition, the RBA appears to be ignorant of standard business practices such as the "cash discount". It writes, "the consumer typically decides which means of payment is tendered and used in a transaction".[25] Yet merchants and consumers often bargain over price and over payment method. The cash discount is a very common mechanism to induce consumers to switch payment method. This is an astonishing oversight for the RBA given that it assumes the alternative payment mechanism to credit cards is a cash payment.

In summary, the RBA engaged in an extensive regulatory intervention based on poor theory and no empirical evidence. Theory has not provided an unambiguous indication of market failure, and there is no empirical evidence to support the notion of monopoly pricing – other than a vague notion that interchange fees are "excessive".

While we have other criticisms of the RBA approach – for example, we suspect the regulatory interventions were protectionist measures designed to support the local eftpos system – those arguments are beyond the current paper.

In March 2006, the Melbourne Business School hosted a Payment Systems conference discussing the interchange fee regulations in Australia.[26] Jean-Charles Rochet (of Rochet and Tirole fame) presented at that conference and made a number of predictions:[27]

First predicted consequences of a reduction in interchange fees:

- *increase in cardholders fees,*
- *decrease in merchants fees,*
- *reduction of the profit of issuers,*
- *increase in the profit of acquirers.*

Reduction in interchange fees likely to decrease the share of card payments (maybe after a delay). Ambiguous impact on consumer demand and consumer surplus:

- *Merchants may* ***decrease retail prices*** *(small?)*
- ***Transaction costs for consumers increase*** *(less convenient to use cards)*

Most important consequences of a reduction in interchange fees are medium to long term:

- *Issuing is likely to become more concentrated and less efficient*
- *Issuers may be tempted to bypass the regulation of interchange fees (socially inefficient)*

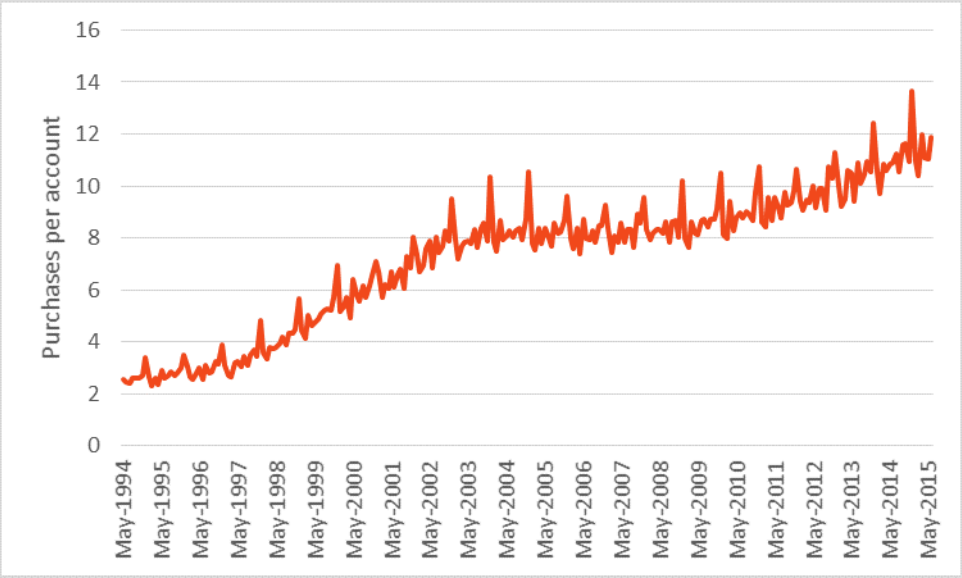
While it is not possible to test all of these predictions – it is possible to test some of them. What is particularly noteworthy, however, is that Rochet clearly identifies that profitability can and will be

[25] RBA, 2015, pg. 8.
[26] Papers available at http://web.archive.org/web/20060613224511/http://www.mbs.edu/payments_system/
[27] Emphasis original.

impacted by regulatory change, yet the RBA fails to discuss that issue. Rather the RBA focusses on consumer price changes, something that Rochet suggests will be small.

It is clear from the data that there was some impact in the credit card market following the RBA's regulatory intervention. We show that consistent with Rochet's predictions the advantages of using credit cards declined and the benefits associated with using credit cards declined. In Exhibit 2 we calculate the average number of transactions per credit card account using RBA data.[28]

Exhibit 2: Transactions per card



Source: RBA Statistics, Author calculations.

There is a very clear turning point in the data following the RBA's initial regulatory interventions. The growth in credit card transactions plateaus for nearly six years. Clearly the advantages associated with using credit cards declined.

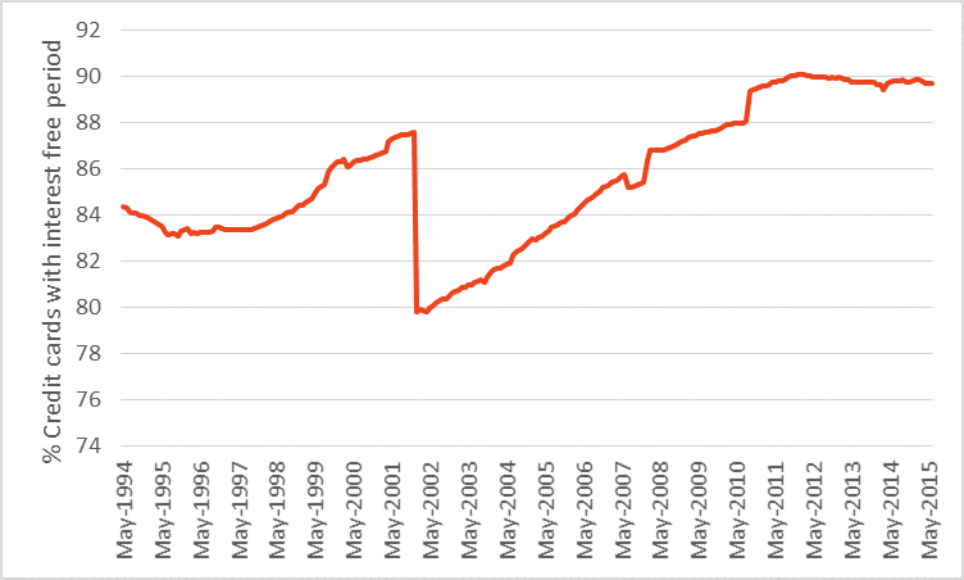
Similarly the benefits of using credit cards declined too. In Exhibit 3 we show the proportion of cards that had an interest free period.[29] Looking at the exhibit, the result is quite stark. A sudden decline from 86.7% in December 2001 to 79.8% in January 2002 is a massive change. While those dates do not quite line up with the actual regulatory timeline set out in table 1, it does immediately follow the publication of an RBA consultation document into the Australian credit card market. If we were to assume that financial institutions and consumers correctly anticipated the RBAs intentions then it is plausible to imagine that they would modify their behaviour before the regulatory intervention.

At the same time Rochet had predicted that issuing would become more concentrated. The RBA provides market share data for credit card schemes but indicates that one of the original three schemes

[28] Number of credit and charge card purchase transactions divided by Number of credit and charge card accounts.
[29] Number of personal credit card accounts with an interest-free period divided by Number of credit and charge card accounts.

that it initially regulated, Bankcard, closed in January 2007. At the same the domestic payments scheme eftpos has lost market share too.

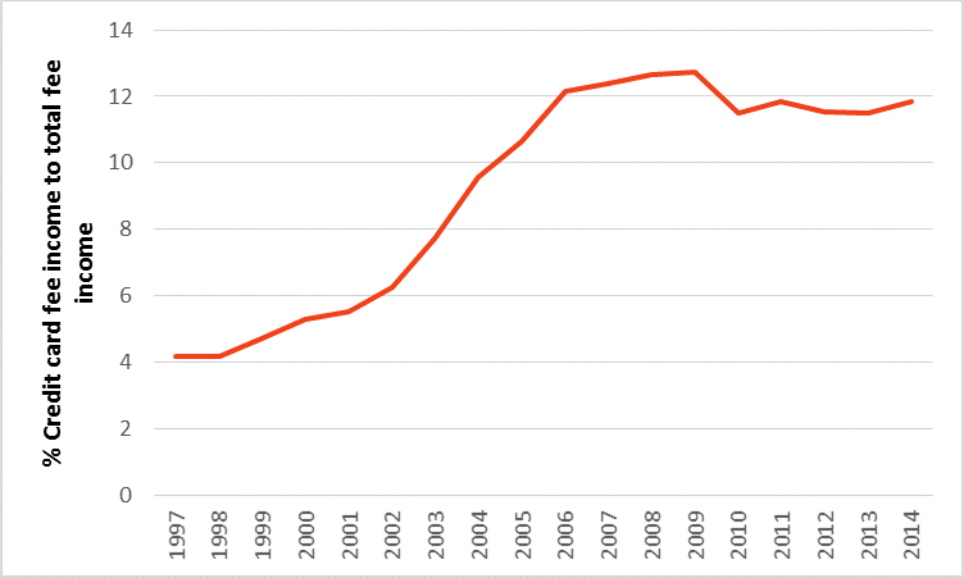
Exhibit 3: Proportion of credit card accounts with an interest free period



Source: RBA Statistics, Author calculations.

In Exhibit 4 we show the proportion of bank fee income from credit cards as a percentage of total bank fee income. It is clear over the period the RBA was introducing its regulations that fee income from credit cards accelerated as percentage of total bank fee income.

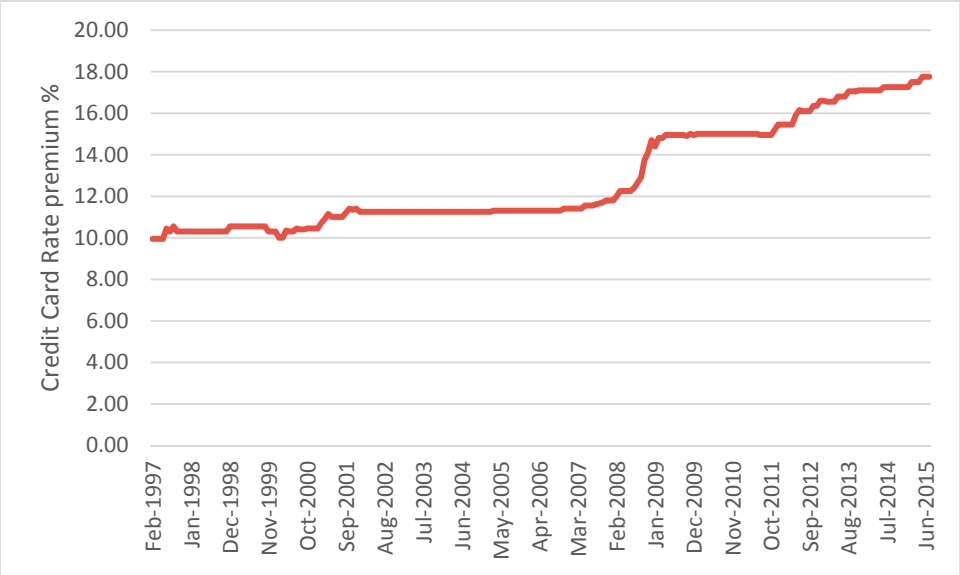
Exhibit 4: Credit card fee income to total fee income



Source: RBA Statistics, Author calculations.

Finally we show the credit card (standard) rate premium over the cash rate in Exhibit 5. Between December 2000 and December 2001 there is a 95 basis point increase in the credit card interest rate premium over the cash rate. In the context of the subsequent global financial crisis and risk-rerating that has occurred over the past few years, that increase is small. Nonetheless it is clear that interest rates charged by financial institutions moved in anticipation of regulatory change.

Exhibit 5: Credit card premium over Cash Rate



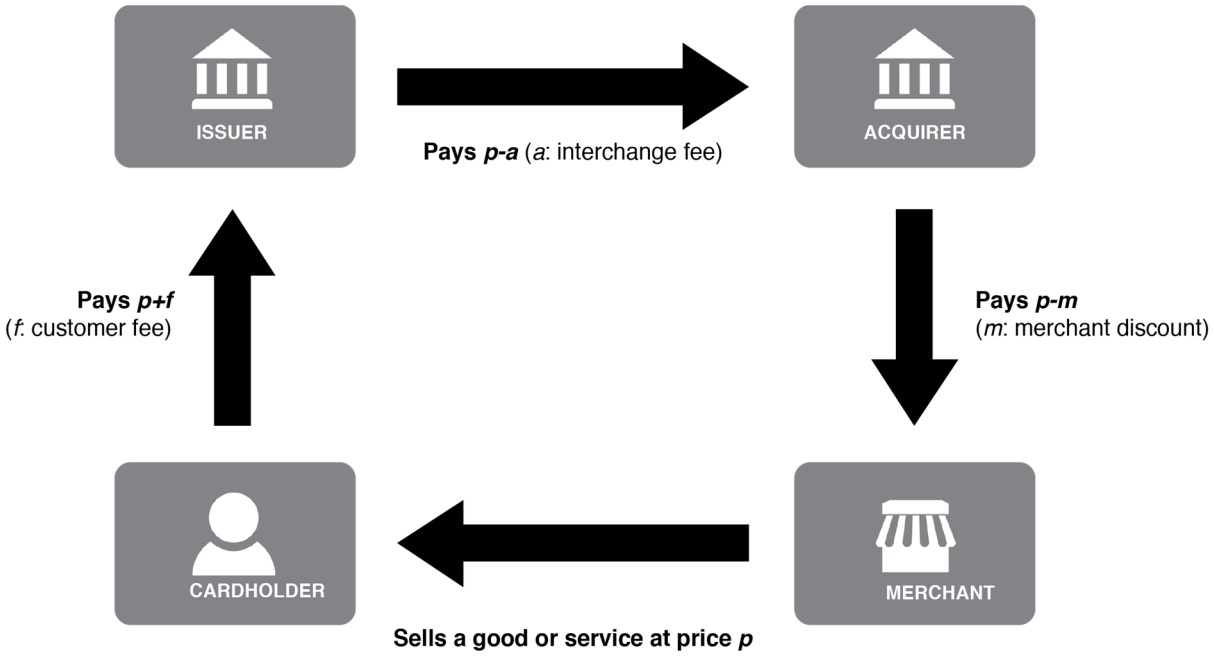
Source: RBA Statistics, Author calculations.

Consistent with Rochet's predictions, the RBA regulatory intervention has resulted in consumers paying more for their credit cards in the form of interest and increasing the fee income of banks while the benefits of the cards declined. The usage of credit cards relatively declined. All that for the $13 billion saving to merchants that the RBA identifies – yet the RBA is uncertain as to what actually happened to that money. They assume that it was passed onto consumers, but cannot know for sure. In addition, they are unable to point to any actual decreases in consumer prices following their intervention.

4. Alternative perspectives

We believe that the Reserve Bank has failed to understand the problem at hand. To see the issue more clearly consider not their exposition of the interchange fee as shown in figure, but rather Rochet and Tirole's exposition that we reproduce in figure 2.

Figure 2: Rochet and Tirole depiction of an interchange fee



Source: Rochet and Tirole (2003: 74)

This depiction shows the net cash flows in the various relationships. Again the consumer (cardholder) buys goods and services from the merchant. The consumer then pays the price (p) and a net fee to his financial institution. The consumer's financial institution then pays the price (p) less the interchange fee (a) to the merchant's financial institution who then pays the merchant the price (p) less their own net fee. This depiction of the issue makes very plain that if both financial institutions are to remain profitable that m > a. The merchant pays the interchange fee. Of course, this is not surprising. The interchange fee exists to rebalance the relationships within the two-sided market. In a competitive market for financial services, the interchange fee would be used to reduce the net consumer fee for credit cards. It is also unsurprising then that retail associations have led the charge against interchange fees. After all it is cost of doing business to them and reduces the profitability of their businesses. The subsequent regulation of the market is then well explained by the 1981 economics laureate George Stigler's theory of regulatory capture.

However, the basic issue is not one of monopoly exploitation, which has thus far been the guiding regulatory impulse that Stigler criticises, but rather is one of efficient contracting in the shadow of what 2009 economics laureate Oliver Williamson (1973) called the Fundamental Transformation that occurs in consequence of transactions that require both parties to make idiosyncratic investments – transforming ex ante competition into an ex post bilateral monopoly – that can subsequently give rise to opportunism.

The credit payments system is not and cannot ever be an interlinked series of anonymous spot markets exchanging financial commodities because the information asymmetries and moral hazards inherent in these exchanges require the parties to the transactions to make idiosyncratic investments (also known as asset specificity) that bind them into a bilateral monopoly – i.e. the fundamental transformation – in

which quasi-rents[30] are only secured through mechanisms to inhibit opportunism by aligning incentives to long term relational contracting.

The interchange fee, we argue, has evolved as an efficient governance mechanism to achieve this outcome without requiring horizontal integration – i.e. collapsing the four party payments system into a three-party payments system, and the associated losses of technical and information efficiency and competition that would imply. Banks need to make transaction specific investments in acquiring information about the properties of customers and merchants, the value of which – the quasi-rent – is realised through a long term relation.

4.1. Argument 1: The interchange fee represents an efficient institutional mechanism, not monopoly exploitation

Alternatives to collective setting of interchange fees, varying from bilateral negotiation to government-regulated cost-based fees, all have serious drawbacks in terms of generating excessive transactions costs, failing to internalize external benefits and costs, and distorting incentives.

Chang and Evans (2000: 461)

The existence of the interchange fee at what appears to be both a fixed and high level has been criticized by competition regulators because of its seeming departure from what would be expected in a perfectly competitive market. Among competition authority regulators, this is widely taken to be prima facie evidence of collusive price fixing and monopoly exploitation.

In an institutionally frictionless world of zero transaction costs, perfect rationality, perfect information, and zero uncertainty, any such fixed fee structure collectively agreed upon by competitors that seemed to generate permanent uncontestable flows of what would appear to be (natural) monopoly rents would certainly appear to be evidence of collusive monopoly exploitation. In this version of the story, the monopoly aspect of these rents are attributed to high entry costs owing to strong network effects on payments platforms.

In consequence, banking and competition regulators around the world have sought price caps on bank interchange fees (Schmalensee 2002). In Australia, this was reduced from 0.95% to 0.55% in 2003 (Europe Economics 2014: 27-32). These regulatory imposed fee caps are allegedly justified because they restrain anti-competitive behaviour and therefore benefit consumers.

Not only is there no evidence for this supposed regulatory benefit (ATA & IAEP 2015), but we argue that the economic theory behind it is also flawed. What it neglects is the adapted efficiency of the contractual and governance structure of the economic organization of payments systems and consumer finance.

[30] Klein et al (1978), pgs 289 – 307.

The argument we make (expanding on the work of Chang and Evans 2000) is that the interchange fee, as it has emerged and developed around the world over many decades, is an efficient governance outcome in a largely private ordering of mostly long term relational contracting between consumers, issuing banks, acquiring banks and merchants, all operating in the context of uncertainty, opportunism and asset specificity (Williamson 1985).

There are two specific aspects that we seek to highlight, both of which point to the fact that these are non-standard exchanges, and that the particular institutional and contractual features of the overall economic organization that depart from an Arrow-Debreu zero-transaction cost and complete markets model – i.e. the interchange fee – most likely reflects efficient contractual governance adaptations to these particular aspects of the exchange situation.

(1) The four-party exchange involves different types of contractual relationships, only one of which (between customer and merchant) is typically a spot-market transaction. The other three that have banks at one or more ends are typically long-term relational contracts. These involve complex contractual agreements that trade-off risks from uncertainty, opportunism, and asset specificity. The conditions of the spot market will be considerably shaped by the agreements made in the other three long run relational contract markets.

(2) The default payments model is assumed to be cash, which is assumed to be costless as a two-party-exchange between consumer and merchant. The four-party credit exchange relation is assumed to be more costly because of the additional services offered in the interbank payments and processing network that benefit both consumers (by extending finance) and merchants (by facilitating payments, screening credit-worthiness, covering credit risk). Both consumers and merchants benefit from these services and are willing to pay for these services. However, cash is also costly to both consumers and merchants (carry cost, risk, opportunity cost) and thus both will be willing to pay to use an alternative payments technology that mitigates these costs. Yet in a pure exchange spot market, merchants will only accept cash because to accept credit requires them to assume the costs of screening or of a long-term relationship that exposes them to consumer opportunism. However, by leveraging off the long-term relations established in the interbank payments networks, merchants can become indifferent at some fee margin between cash and credit transactions in the spot market, thus maximizing the overall transaction value by accepting all bids.

Our central argument then, as informed by transaction cost economics and the New Institutional theory of the firm (Williamson 2002), is that the various structures of fees that we observe in the long-term relation contracts that banks intermediate are most likely to represent an efficient bargaining outcome to arrive at stable long term relational contracts, given the various risks associated with opportunism and asset specificity, and are therefore not prima facie evidence of monopoly rent extraction.

The spot market between consumer and merchant is likely to be efficient when effective governance institutions in the long-term credit networks and payments systems emerge. These are facilitated by the inter-banking system, at the core of which is the interchange fee.

In consequence, regulatory attempts to treat these fees as if they were the result of collusive rent-extraction by seeking to constrain them within a price ceiling can risk harming an otherwise efficient system of institutional adaptation through long-run relational contracting to specific governance problems associated with uncertainty and transactions costs in the supply of consumer finance and payments systems (Balto 2000, Chang and Evans 2000).

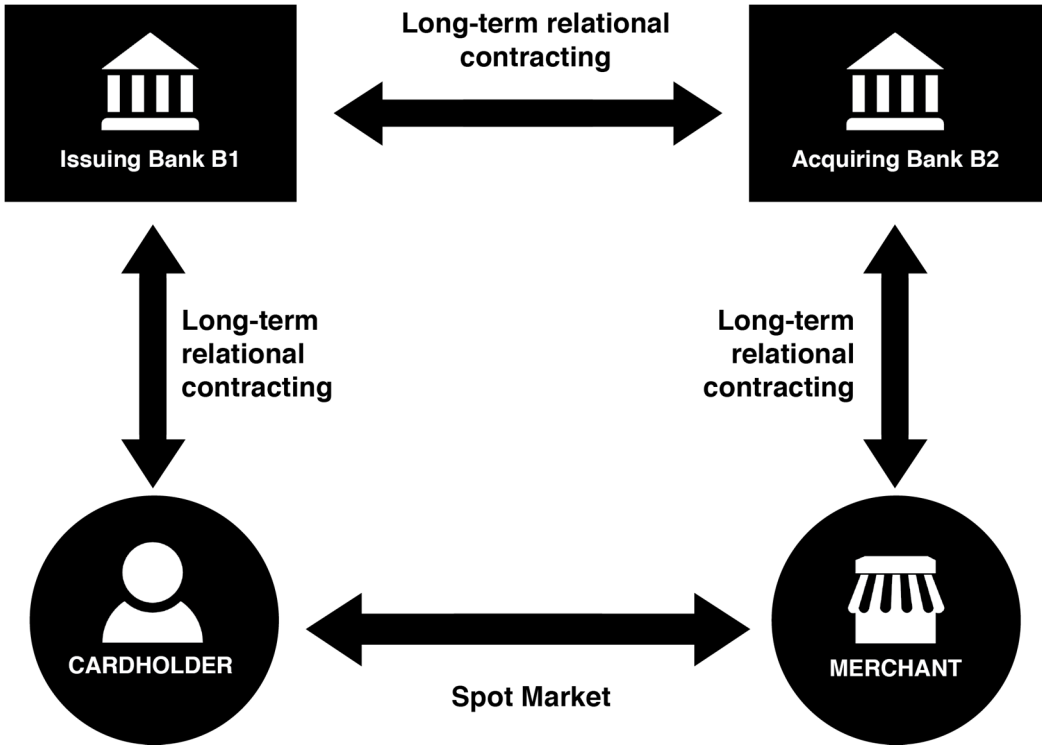
Models of the four-party and two-party payments systems

In a simple model of economic coordination, all exchanges take place in spot markets between firms (which in this model are hierarchical organizations whose boundaries are determined by the technology of production). In such a world, payments networks and consumer finance would be modelled as a natural monopoly (because of scale economies and network effects) such that the most efficient form of economic organization would be a single monopoly firm – call it The Bank. All consumers and all merchants would be customers of The Bank. The Bank would levy a fee across consumers and merchants, but the incidence of which would ultimately fall on consumers either directly or through higher prices as a function of the substitution margin with cash. An interchange fee would simply be an internal aspect of the firm's cost accounting. The total price The Bank charges would likely be regulated.

But under competition in retail payments networks, consumer banking and finance, and merchant banking we expect there will be multiple banks and that the boundaries of banks and financial services firms will depend upon specialization, competences and capabilities, often tied to specific assets (including reputational assets and context specific knowledge). This will be governed in large part by long term relational contracts between agents and firms, such as between customers and a bank, both consumers and merchants, and between firms within the banking and payments network. Indeed, for the most part the only spot contracts in this system of economic coordination are the exchanges of goods and services for money between consumers and merchants.

Figure 3 re-imagines the credit card network from a contractual governance perspective. Our central argument in this report is that figures 1 and 2 (above) have dominated discussion and analysis without sufficient consideration of the implications of figure 3.

Figure 3: Interchange fee in a governance framework



Source: Davidson & Potts 2015

Theoretical foundations: efficiency, not monopoly

The efficient organization of economic activity entails matching governance structures with these transactional attributes [uncertainty, frequency of exchange, asset specificity] in a discriminating way.

Oliver Williamson (1979: 261)

Economics laureate Oliver Williamson won his prize in large part for his classic work *The Economic Institutions of Capitalism*. Building on the work of Ronald Coase, Williamson developed the transaction cost-based field of New Institutional Economics, at the heart of which was a clear distinction between the monopoly branch and the efficiency branch of microeconomic analysis. As Williamson (1985: 23) explains:

The monopoly approaches ascribes departures from the classical norm to monopoly purpose. The efficiency approaches hold that departures serve economizing purpose instead.

Williamson explained how economic agents will seek to 'organize transactions so as to economise on bounded rationality while simultaneously safeguarding them against the hazards if opportunism' (ibid: 32). Williamson's point is that sometimes forms of economic organization that may look like collusive or monopolistic behaviour when examined in terms of resource allocations are actually forms of economizing when analysed from the institutional perspective of transactions.

We argue that the dominant regulatory view of payments networks and interchange fees is through the lens of the monopoly view of economic organization (Carlton and Frankel 1995). This view focuses on resource flows and rents (as in figure 1), and within that seeks to identify the exercise of monopoly power. The monopoly view of bank interchange fees is based around an applied price theory approach in which barriers to entry give rise to leverage and price discrimination, resulting in rent capture. The implied correction to this outcome is to restrict the ability to exploit the rents through a legislative price ceiling – i.e. fixing a maximum interchange fee.

But this same situation looks rather different when the unit of analysis is the transaction (as in figure 3). The notion of a transaction includes both exchanges and contracts. Economic organization can occur in a spot-market (exchange) with neither future promises nor responsibility, or through long-term relational contracting, where parties make investments of which the profitability and utility depends on the other parties subsequent behaviour (Alchian and Woodward 1988: 66). Transaction cost economics predicts that where there are transaction specific assets, trading regularities will emerge that support and signal continuity intentions (Rochet and Tirole 2000), thus expanding trade from a unilateral spot-market relation to a bilateral ongoing relational contract.

From the transactions cost perspective, observed departures from the classical model may therefore reflect economizing behaviour in conducting ongoing transactions, and in the context of risk of opportunism and bilateral investment may already be ex post efficient forms of organization of economic activity. In consequence, if these adapted institutions and contracts are efficient forms of economic organization, then regulatory intervention will harm efficiency. Consider why this might be so.

Long term contracting and spot markets in credit and payments systems

Figure 3 indicates that of the four types of transactions relations between consumers (C), issuing banks (B1), acquiring banks (B2), and merchants (M), three of those relations (C-B1; B1-B2; B2-M) will usually be governed by long-term relational contracting, and with only C-M being a spot market transaction. Why is this?

First, why are they not all spot contracts? Specifically, why are C-B1 and B2-M typically long-run relational contracts rather than spot contracts?

One, they are engaged in multiple repeated transactions, and minimizing transactions costs associated with processing scale economies are achieved through bundling transactions through a single supplier. This incentivizes B1 to form a long-term contract with C.

Two, there is asymmetric information about creditworthiness of C that accumulates through repeated transactions, and which then enables a cumulatively better offer to be made to C as their true risk is cumulatively revealed, which then incentivizes C (if their 'true type' is low risk) to form a long-term contract with B1. This moral hazard problem of constraining C to good behaviour is enforced with threat of expulsion from the contract by B1, which would then take them back to a higher rate with a new issuing bank that had not accumulated information about the credit properties of C.

This in turn works as an effective screening mechanism by B1 on C, because only a high quality C will accept the conditions of a long-term contract, which will be valuable to C and profitable to B1, only if C can be effectively constrained from opportunistic behaviour.

Three, the same arguments apply between B2 and M, where B2 accumulates information about the transaction volume of M and their propensity to accept fraudulent sales (which require chargebacks). This information is a specialized asset that is profitable to B2 (and B1) if they can constrain opportunism by M (and C). The long-term relational contract, and the credible threat of expulsion from that contract, is an efficient governance mechanism to organize economic coordination in the context of the threat of opportunism and information asymmetry.

Four, incomplete relational contracts enable many specific contingencies to be dealt with by negotiation between the parties under the threat of exit, with the ensuing costs that imposes. These are a private ordering that may have final recourse to courts, but will often be most efficiently handled through direct bargaining under credible commitments and threats through the various hostages (threat of default versus threat to harm credit score) that each side has offered the other (Williamson 1983).

Five, long-term contracts may arise because of differential risk preferences between consumers, merchants and banks, which banks being systematically risk neutral and consumers and merchants being risk adverse.

Second, why is B1-B2 a relational contract, rather than either a spot exchange or horizontally integrated within a single firm (see Williamson 1985: ch6)?

A single bank – integrating B1 and B2 within a single firm – might be technologically efficient, but would be informationally inefficient, would be exposed to greater risk of shirking behaviour because of information impactedness and costly monitoring, and would be exposed to opportunism in internal pricing transfers. Because retail consumers and merchants are highly heterogeneous and

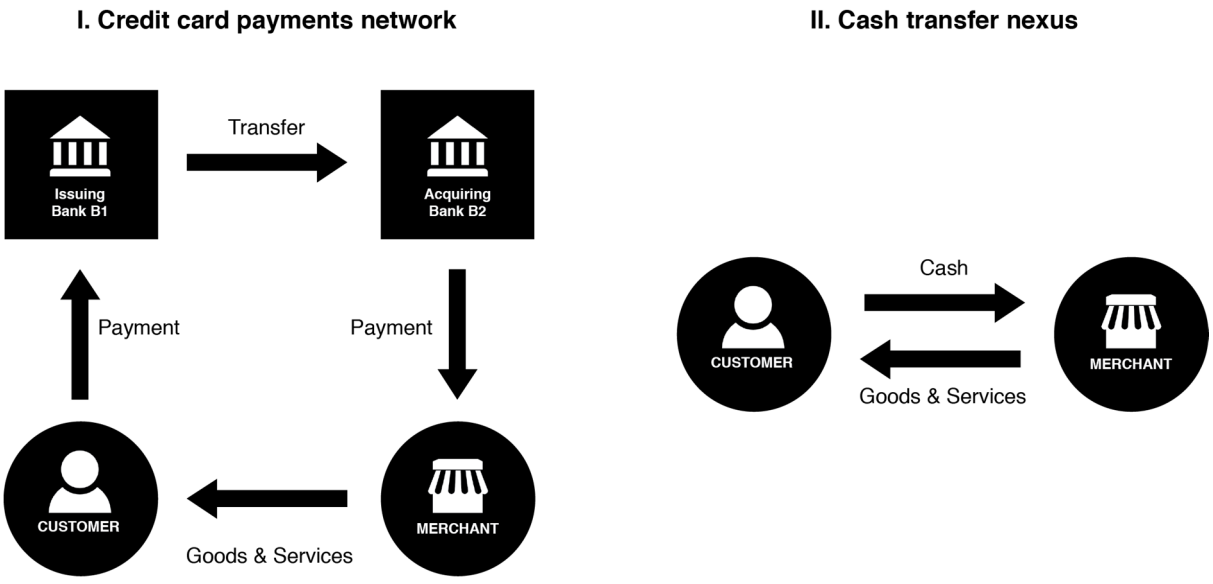
geographically distributed, specialized skills and investments are required in assessing quality (i.e. true type) and in delivering services. Banks will therefore tend to specialise under competition in order to economise on information. Long-run relational contracts then reconnect this into a payments network under high-powered incentives. In general this can be observed in the relative market success of open payments networks over closed payments networks.

Long-term relation contracting is efficient because banks take different sides of many transactions, giving rise to threat of exploitation through non-cooperative play. However, opportunism is disciplined only by threat of retaliation. Furthermore, repeated transactions enable learning and synchronising of processes and transaction routines in order to generate an efficient payments system, all without loss of high-powered incentives if the transactions were integrated into a single firm.

4.2. Argument 2: Equilibrium in choice of payments: cash versus credit cards

An important point follows from these considerations of the payments system in terms of transaction costs and the institutions that develop to efficiently govern these. In essence, these will be some margin of equivalence between alternative governance institutions, which we represent in figure 4 below with the credit card payments network on the left and the cash transfer nexus on the right.

Figure 4: Payment Networks and Cash Transfer



Source: Davidson & Potts 2015

First, the added complexity and physical and organizational resources involved in the card payments network, which are approximated by the flow of fees that consumers and merchants pay to the banks, will in equilibrium be competitively disciplined by the threat of exit to the cash transfer nexus (on the right in Figure 4 above). What is crucial to understand is that the cash transfer nexus is not the default setting of free, against which to compare the costs and fees of the card payments network. There are significant costs associated with the use of cash, for both customer and merchant, and both will be willing to pay some margin to avoid those costs. For the consumer, the costs are the carry costs and risks of using cash. For the merchant, these are the same costs in processing cash, but also in the

reducing in sales due to financing constraints by the consumer. The merchant will be willing to pay some margin to enable the consumer to access credit.

Second, the merchant is not indifferent between cash and credit because of asymmetric information and adverse selection. For the customer, in their relation with Bank1 and Merchant, the equivalence between cash and credit depends on the benefit of liquidity plus the carrying cost of liquidity (cost of carrying cash, cost of credit cards). In equilibrium, the cost of carrying and using cash will equal the maximum credit fee charge. However, this assumes that the customer is of a type: 'creditworthy and solvent', and that this is known to the merchant and the bank. Yet there is no reason to suppose the merchant knows this, or can acquire this information at low cost.

An equivalent argument occurs on the merchant side of the equation. In a long-term relationship between Customer and Merchant there would emerge an equivalence between cash and credit, plus the transaction cost that would be self-enforcing in long run equilibrium of a repeated game only if the exchange relation was at least a one-sided monopoly. But in a competitive spot market the logic is different because the consumer choosing credit over cash is not just facing a transaction cost decision but also signalling information about their 'true type' as a credit risk [i.e. good or bad]. A consumer choosing credit in the C-M transaction risks signalling that they expect not to pay (that they are a bad type), which drives an adverse selection/moral hazard spiral that will drive credit out of the spot market, leaving only cash. This will result in a lower equilibrium level of transactions because good credit use in the spot market (i.e. 'good' customers, for whom the cash carrying cost greater than the credit fee cost) suffers a 'lemons' problem (Akerlof 1971). B1, however, has a long term relation with C, and thus can effectively underwrite that use of credit in the spot market.

5. Summary and Analytic Conclusions

Interchange fees are not a problem of monopoly exploitation, but rather an efficient solution to an unavoidable bilateral monopoly that arises because banks need to form long term relations with customers and merchants – what are in effect irreversible investments that pay off only if the relationship continues – and which are therefore vulnerable to opportunism.

We make two specific theoretical claims that explain why regulatory intervention to cap the interchange fee will harm consumer welfare. Both claims hinge on recognizing that the governance structure of the card payments system is composed of long run relational contracts, the threat of exit from which disciplines short run opportunism in the system.

First, the interchange fee equilibrates the issuing (B1) and acquiring (B2) sides of payment cards systems. A fee setting association of banks is not evidence of collusive monopoly, but of minimizing transactions costs across the network in achieving economic coordination between all transacting parties. Constraints placed on internal bargaining and side-payments – i.e. an interchange fee ceiling – cause less efficient outcomes, resulting in higher fees to consumers and an unnecessary loss of social welfare.

A further implication is that interchange fees also enable an efficient network governance structure based around relational contracting that avoids horizontal integration between issuing and acquiring banks, maintaining incentive intensity and minimizing administrative monitoring burden arising from information impactedness.

Second, the relevant theoretical comparison between the four-party card payments system and the simple two-party cash nexus exchange must recognize that cash is also costly to consumer and merchant and that both parties will be willing to pay some margin to use a superior payments technology. This can be seen clearly when we consider why merchants do not usually offer credit payments to customers – or are risk averse in doing so – but banks can be risk neutral in this offering, namely because they are in a long term relational contract with the customer, and can effectively punish opportunism. Both consumers and merchants are willing to pay to avoid cash transactions by agreeing to enter long term contacting relations with banks.

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Attachment 2

WHO SHOULD REGULATE THE BANK INTERCHANGE FEE?

The RBA or the ACCC?

Sinclair Davidson and Jason Potts

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It's run like a secret society. No one can explain why this [regulating payments, setting interchange fees] is a function retained by the RBA. The *Payment Systems Board* is the least transparent, most secretive and poorly understood government body that is responsible for every transaction that takes place in this country.

– Senator Sam Dastyari, Chair, Reference Committee on 'Matters relating to credit card interest rates' (Sept 2, 2015)

Summary

Since 1959 the Reserve Bank of Australia has occupied dual statutory functions in: (1) the central bank role of the setting and conduct of monetary policy, including ancillary roles of banknote provision and banking services to the Federal government; and (2) the regulation of the payments system. The case for RBA regulatory control of the payments system (including the bank interchange fee) was always based on its relation to the first function – its ability to promote stability and control risk in the financial system through a secondary role of promoting *efficiency* and *competition* in the payments system.

Yet there has never been a strong case for these two distinct functions – monetary policy, and regulating the payments system – to be contained within the same agency. It is a holdover from a more protectionist era. Indeed, economic theory suggests these are distinct functions should be separated because they draw upon distinct theory, specialization, and experience: the monetary policy function drawing on monetary economics and macroeconomics, and the payments function drawing on theory of competition and industrial organization.

Once we recognize that the ACCC, as a specialised competition regulator, is the appropriate agency to regulate the payments system and interchange fees, the issue then arises as to why the government would be engaged in fixing a market price. We suggest that the interchange fee does not so much need to be regulated as demystified, and that the RBA has systematically failed in this task.

This tension is seen in the consumer welfare losses and distortions to industrial organization caused by the RBA fee-capping regulation of the bank interchange fee in 2003 (IAEP/ATA 2015). It is also seen in the politically motivated demands that the RBA 'do something' about supposed hidden bank and card fees, when microeconomic theory suggests there is no problem here to solve.

We argue that the regulatory function over the payments system should be removed from the RBA and placed with a transparent specialist agency with capabilities and experience in regulating competition and industrial organization.

1. The Nature and Role of the Reserve Bank of Australia

The Reserve Bank of Australia (RBA) is Australia's 'independent' central bank. The primary function of any central bank is the conduct of monetary policy. In Australia monetary policy has since 1993 been conducted under an independent charter requiring inflation targeting and pursuit of macro-financial stability, using the tools the RBA has at its disposal, including setting the reserve cash rate, and the conduct of open market operations using its financial reserves. This role also includes issuance and management of banknotes, which are the legal tender required for payment of Australian taxes. A parallel role, occupied since it separated from the Commonwealth Bank in 1960, is to function as the Australian government's bank.

Two Boards

The Reserve Bank consists of two Boards: the Reserve Bank Board, which covers monetary policy, and the Payments System Board (authorized by Division 2, Part IIIA of the Act) which covers policy relating to the operation of the payments system.

Since the 1997 Wallis Report, the regulation of the Australian financial system is no longer based on status but is based on function. This resulted in the creation of new agencies. The Payments System board of the RBA was given responsibility for decisions that concern the payments system by the Payments System Regulation Act (1998). The Australian Prudential Regulatory Authority (APRA) (established by the Australian Prudential Regulatory Authority Act 1998) was created to take over a role previously exercised by the RBA of prudential supervision. And the Australian Securities and Investment Commission (ASIC) (formerly Australian Securities Commission) was given powers to regulate appropriate standards of market conduct by financial institutions, including the Electronic Funds Transfer Code of Conduct.

The RBA's own description of its role in the payments system is as such:

> A safe, competitive and efficient payments system is essential to support the day-to-day business of the Australian economy. The Payments System Board of the Reserve Bank has a mandate to contribute to promoting efficiency and competition in the payments system, and the overall stability of the financial system. The Bank oversees the payments system as a whole, which encompasses a wide variety of individual payment instruments – ranging from cheques and payment cards to high-value corporate payments – and the usually unseen arrangements that ensure the smooth transfer of funds from accounts at one financial institution to another. The Bank also has a formal regulatory role to ensure that the infrastructure supporting the clearing and settlement of transactions in financial markets is operated in a way that promotes financial stability. In addition, the Bank has an important operational role in the payments system through its ownership and management of the Reserve Bank Information and Transfer System (RITS), Australia's real-time gross settlement system.
>
> (Source: http://www.rba.gov.au/payments-system/)

The efficient function of the payments system – in effect a mutual clearinghouse requiring interoperability – requires many different financial firms to work together, creating hazards of collusion. The Payments System Regulation Act (1998) allows the Australian Competition and Consumer Commission (ACCC) to override the Trade Practices Act (1974) that would otherwise make such

cooperative agreements between competitors illegal. Since 2001, the Reserve Bank has been granted the power to regulate the payments system.

The Payments System (Regulation) Act 1998 gives the Payments Board the power to address clearing and settlement issues, including the determination of standards, of the payments system. It is important to note here that, as a practical matter, the clearing system was owned by Australia's licensed banks, and the main issue for financial competition in payments was access to that system. The banks themselves argued that exclusion of non-bank financial intermediaries along with other exclusions from this system were justified on grounds of financial stability (echoing, obviously, the RBA statutory mandate). But it is also plainly true that this same behaviour clearly benefited the participants in the payments system by excluding competition. This regulatory issue, therefore, is manifestly one of competition policy.

Basic Economics of RBA scope and function

The RBA therefore has a legitimate role in the expert conduct of monetary policy in order to ensure monetary stability in Australia's official currency (the AUD), as associated with low, stable inflation. Monetary stability is a near perfect public good that can be expertly and efficiently supplied by a monopoly provider – the RBA.

While we do acknowledge that a free banking system (Hayek 1976, 1978, White 1999) also provides monetary stability through competitively issued currencies, and thus without the need for a central bank, this is not the line of our argument. By most accounts, the RBA has successfully furnished broad monetary stability over the term of its independent operation targeting inflation (1993 – present). In both theory and practice, there is a widely understood need for this role to be conducted autonomously and secretively.

But the economic reasoning contained in this argument does not extend to the payments system, which is *not* a public good, but rather is a suite of technologies and organizations, i.e. an industry. The payments system refers to a vast network of operations, agreements, rules and technologies that enable payments to be transacted between all parties in the Australian economy. Like the Internet, it is not a single system but a network of networks. It is also important to note that it is not a public network, but an interlinked web of private systems: it is an open private network. It is useful to think of the payments system as a network infrastructure that has cumulatively emerged from entrepreneurial actions, as the economy has grown and developed, in order to facilitate the transaction needs of a market economy. The payments system was not created by the RBA, and a payments system would exist without the supervisory oversight of the RBA.

From a regulatory perspective, the payments system is not a public good but rather is a technology, a network, a market, an institution, and an industry. This should be approached as a separate issue of industrial organization. Yet this is not what currently exists or what happens. The RBA has taken on exclusive responsibility to regulate the payments system, and furthermore does so under the same operational cover of secrecy and independence as the conduct of monetary policy, where such secrecy and independence are essential to ensure policy effectiveness (Kydland and Prescott 1977). But no such argument can be made for regulating what is, in effect, competition policy. Instead, there is the risk of unaccountable policy mistakes, what Djankov *et al* (2003) associate with the social costs of government intervention (or the "costs of dictatorship" in their terminology).

2. Is there a case for the RBA having regulatory authority over the Payments System in general and the interchange fee in particular?

On the face of it, it might seem entirely natural that the RBA, as the nation's statutory central bank, should regulate the payments system that interlinks all of the transactions in the economy, and that pass through all providers of payments services, which are largely composed of competing commercial banks and providers of financial services. The RBA has regulatory power over what would otherwise be private negotiations over contracts between competing firms in pursuit of mutual gains from trade – such as credit card interchange fees between acquiring and issuing banks – because this falls within its payments system remit.

But that logic does not make a case for the RBA in particular, just for any specialized agency. Rather, the reason for RBA involvement in regulation of the payments system in general, and of specific issues such as credit card interchange fees in particular, is because the RBA has historically been concerned about the cost of the operation of the price system. This is a macro-institutional concern, derived from the long 20th century battle between market capitalism (the price system) and communism (the command system). Monetary and price stability coupled with efficient operation of a payments system is essential to the flourishing of a market exchange system.

But there is no inherent reason, other than the payment of taxes, why this needs to be based entirely on a derivative of a cash payments system using official government money. Once it is appreciated that money is a technology, the institutional form of a financial technology (Menger 1892), and that payments is a market service, and that the issuing and operation of credit is a value adding market service, it becomes clear that public welfare in a market economy is best served not simply by minimizing the cost of the operation of the price system, but by maximizing the benefits of the price system.

Cost minimization is easy enough to achieve by prescribing a simple capped offering, but that has the (unintended?) consequence of constraining the commercial development and market offering of superior or varied credit and payments services (including for example, no fees cards, or those offering extensive rewards programs). A price cap on financial services works in exactly the same way a price cap does in any sector, effectively eliminating all possible market supply above that price, and therefore reducing the choice set facing consumers. By reducing the ability for suppliers to price discriminate, the market is made less efficient. Ultimately, this results in a less effective, less competitive, and less innovative market for money, credit, and payments services.

There is no strong case for the RBA to regulate the Payments System

The oversight and regulation of Australia's payments system has been with the RBA since 1959, where it accrued more or less by default, in the absence of a specialized regulatory agency. Indeed given the underdeveloped competitive state of the banking and payments system at the time there was no perceived need for such a specialised agency. The main argument for why the regulation of the payments system still remains with the RBA, through the various inquiries and reviews of its scope and ambit, can be summarized, in essence, as 'because it has been with the RBA since 1959'. In more technical terms the regulatory status quo has been determined by path dependency.

The payments system has evolved enormously since the 1950s, as a technology built no longer on paper ledgers or paper currency but on digital communications infrastructure and software, as complex business operations, in terms of interfaces and organizational complexity, and as a competitive market. The payments system is as different now from how it was then as, say, are the telecommunications or global logistics industries. Yet the regulatory function and organization remains unchanged.

There is no strong or explicit case for positioning the oversight and regulation of the payments system within the RBA. This can be seen in the RBA's own public defence of its function in speeches explaining the RBAs role and function, as we will observe below.

However, there are a number of weak and often implicit cases that are regularly made. These can be approximated as follows:

(1) That the payments system has some connection with the monetary system – *viz*. payments are made in money, and because the RBA controls money, it should also control payments.
(2) Interchange fees are connected to credit cards and credit cards involve interest rates – monetary policy involves interest rates, *ergo* the RBA should regulate interchange fees. (This is a variant of 1 above).
(3) The payments system is a utility (run by the banks). Therefore the central bank should regulate this.
(4) The RBA has acquired historical experience in oversight and regulation of the payments system, and so it should continue in this role.
(5) The RBA *should* regulate the payments system because it *can* regulate the payments system.

It does not require a great deal of logical skill to disassemble these arguments: (1) and (2) are fallacies of composition; (3) is a truth conditional (i.e. an empirical claim); (4) is the induction problem, and (5) is the naturalist fallacy. The point is that none of these are solid economic arguments, each can be picked apart logically and empirically, and all carry a large amount of expediency.

The RBA itself acknowledges as much

In a speech in 1996 by then Deputy Governor of the RBA Graeme Thompson on 'The Reserve Bank's Role as it Impacts on Business'[1], Mr Thompson concludes by noting (emphasis added):

> … there is talk from time to time of narrowing the RBA's focus, so that it would have only one or two 'core' responsibilities. In my view such a move would be misguided. There are significant synergies in having the responsibility for both price stability and financial stability in one place. Banking supervision is integral to our financial stability role, and provides information on market and institutional conditions which is helpful to monetary policy. Meanwhile, our operational activities in securities markets, *in the payments system and in conducting banking services give us some 'hands-on' experience in, and a better understanding of, pressures and constraints in the business world*. This, in turn, contributes to the better-informed conduct of our broader policy functions.

[1] Talk to the 1996 National Institute of Accountants New South Wales Congress, 'Maximising Your Business Opportunities', Sydney - 22 May 1996.

This is an instance of both (1) – 'it has something to do with money, so it is good practice for us', and (5) – 'we can do it so we should do it'. Which then supports (4) – 'we do it now because we did it then'.

To further disassemble this argument is to acknowledge that if the RBA had an effective payments simulator, or required its executives to do apprenticeships in banks, the result would be much the same. In other words, this is not an argument about why the RBA should regulate the Payments system, but rather about the benefit the RBA itself gets from that regulatory function.

This is a common characteristic in the RBA's explanation. It explains the benefit the RBA gets from that function – including experience, synergies, and more employees – but these are not arguments about why Australian citizens, consumers, and businesses benefit from RBA regulation.

What is striking, even, is that this persists in the face of the RBAs plain and open acknowledgement that the payments system is clearly a technology and competition driven industry. In 2015, Assistant RBA Governor Malcolm Edey said this in a speech discussing the path from the Wallis report (1997) to the recent Murray inquiry (2014) (emphasis added):[2]

> …Third, and related to the first two points, Wallis foresaw the growth of payment systems as a business, in contrast to the utility-based model that I described earlier. If commercial realities were leading to the unbundling of payments from other financial services, *then it was to be expected that this business would open up to innovative and specialist providers. It also meant that existing players would need to put their own payments services on a more commercial footing*. And lastly, Wallis looked at the regulatory implications of these developments. Payments systems are networks which link service providers and their customers. That means that they need to have ways of ensuring adequate coordination among network members who would normally be competitors. *This in turn raises a whole suite of questions as to whether particular network arrangements are generating efficient outcomes*: for example, is there appropriate access to networks for new players, are network pricing arrangements efficient and are there effective coordination mechanisms to promote network innovation? Wallis concluded that there was a need for regulatory oversight of payment systems, and the recommendations that flowed from that formed the basis for the arrangements we have today.

And the Wallis Inquiry explicitly insists…

So the RBA acknowledges that the goal of Payment system regulation is competitive efficiency. This is also explicitly what the Wallis Inquiry recommends (61-63). The purpose of the RBAs regulation of the Payments system – through the Payments System Board (PSB) – is to promote competitive efficiency in the development of the payments markets, technologies and industry. It is not for the RBA to 'gain experience' or 'exploit synergies'. The Wallis Inquiry argued the case for the separation of Payments from the RBA's core functions.

In the Wallis report summary they say this by way of recommending the creation of the PSB (p. 23-4):

> Competition in the Payments System: Establishment of the Payments System Board

[2] Malcolm Edey, Assistant Governor (Financial System). Speech at the Cards & Payments Conference - "Card Payments Regulation: From Wallis to Murray" (Melbourne - 21 May 2015)

> The task of ensuring systemic stability is closely linked with maintaining the integrity of the payments system. The central bank itself plays a pivotal role in the final settlement of payments. Accordingly, it is proposed that the RBA remain the regulatory authority in charge of the Australian payments system, but with a separate subsidiary board established to oversee this function - the Payments System Board (PSB). The PSB would have some common membership with the parent board of the RBA, including the Governor and one deputy governor. It would make its decisions independently of the main board which would concentrate on monetary policy and economic stability.
>
> The RBA should be empowered to set standards for the payments system, adopting the role of regulator. Any provision of payments clearing services to its customers in competition with the private sector should be clearly separated from the RBA's regulatory function and be subject to transparent reporting arrangements. The RBA should, however, retain its ownership and participation in those parts of the payments system where high level control and coordination is necessary to ensure maximum efficiency; for example, in the provision of the infrastructure for the high-value payments system.
>
> The clearing systems should be subject to access rules which are transparent and subject to approval by the competition regulator. There should be no presumption that any one class of financial institution should have exclusive rights to issue particular payment instruments, with the exception that only DTIs should be able to issue cheques in their own name. Conditions of access to clearing streams will vary and especially high standards may be mandated as necessary. Entry to payments clearing streams should be determined by the PSB and not be controlled by industry organisations.
>
> There should be no presumption that banks will be the only holders of ESAs. The right to hold an ESA should be determined by the RBA on the basis of clear and open guidelines, including the requirement that participants have extensive payments business with third parties.

The language Wallis employs is unmistakably describing a competition regulator, albeit a competition regulator within the RBA that would work with the ACCC. This is reinforced in the Report's summary recommendations – most notably recommendation 61 (emphasis added).

> Recommendation 61: A Payments System Board should be formed within the RBA.
>
> The payments system should be regulated by the RBA under a Payments System Board (PSB). The PSB should have responsibility for *implementing policies to improve payments system efficiency, including the adoption of the most efficient technology platforms, and enhancing the competitive framework*, consistent with overall systemic stability. The PSB should also have general oversight of the clearing streams.

Why do we not have a separate Payments System regulator?

Given the RBAs own somewhat hazy arguments about why it maintains control of the payments regulation function, and the Wallis Inquiry's recommendations toward separation in other areas, it is somewhat puzzling why the Payments System regulation still with the RBA (in the form of the PSB). Detailed analysis of this question is beyond the scope of this paper but in the next section we explain why the RBA is poorly suited for this task.

3. The Case for Regulatory Specialization, or Why the RBA is Poorly Suited to Regulate the Payments System

The RBA undertakes two tasks that on the surface appear related, because they are both about money, but are actually entirely distinct phenomena, based on different underlying economic theory, reasoning, and practical experience. The first argument for their separation is basic economics: namely, to exploit the benefits of specialization – in theory, analysis and experience. By this logic, while the operation of monetary policy is best done by the RBA, the regulation of the payments system is not. Indeed, a case can be made that precisely its lack of specialized understanding and experience in the domain of the competitive dynamics of industrial organization has led to some costly (although underreported) failures (IAEP/ATA 2015).

It is certainly not inconceivable that a single government agency can have multiple unrelated tasks based on distinct specialist functions. The Australian Defence Force, for example, both trains soldiers (a task focused about mental and physical education) and maintains materiel (a task focused about logistics and engineering). But these largely unrelated functions are gathered within a single organization for a compelling reason, namely that they are conjoint inputs in providing the service of security and defence. But this argument does not hold for RBA joint control of monetary policy and the regulation of the payments system. Regulatory control of the payments system is not a necessary co-input into achieving effective monetary policy or in the conduct of open market operations.

Monetary policy is a specialization based on the theory of both monetary economics and macroeconomics. Monetary theory of money in an exchange economy, the theory of money supply and demand, the theory of banking, credit and debt, an understanding of monetary history, and of the monetary transmission mechanism that connect monetary instruments to the macro-economy. Built around analysis of interest rates, and various indices (inflation, asset prices, aggregate demand, GDP, unemployment, industrial production, *et cetera*) the theory underpinning the effective conduct of monetary policy is broadly the study of emergent aggregates, mechanisms and macro-econometric models of economic systems. Both individual economists and also teams of economists or research departments specialize in this task and body of theory and practice.

Monetary economics and policy has its own scientific culture, a specialized language (and scholarly history), and is a branch of economics in the same way that quantum mechanics is a branch of physics and electrical circuits is a branch of engineering. The RBA, as with all central banks, is highly competent in monetary economics and monetary policy.

The economics of industry regulation – of any industry, including financial ones, such as the payments system – is a very different branch of economic theory and practice. First, it is entirely based in microeconomic theory (not macroeconomics) and is focused on market behaviour under different degrees of competition (from perfect competition to monopoly). This is called the theory of industrial organization, which since the 1980s has been extended to consider strategic interactions (through the application of game theory to the previous framework known as 'structure-conduct-performance'). This is based around the study of rational firm behaviour and action in a competitive market context. This approach often incorporates transaction cost economics, imperfect competition, models of technological and entrepreneurial competition, and models of strategy.

Regulatory economics is, in essence, the study of the social control of business. It began in the welfare economics in the 1920s (associated with the work of Arthur Pigou 1938) that diagnosed market failures arising from imperfect competition, particularly negative externalities, and sought to meet these with

deliberate attempts by government to intervene in market outcomes to correct these. This is the public interest theory of regulation. In this approach, the government and its regulators are assumed to be benevolent, competent and wise, and act purely in the public interest. The RBA hews strongly to this model of regulation.

Beginning in the 1960s and 1970s a new economics of regulation developed associated with the Chicago school of law and economics. (This was developed by Ronald Coase, George Stigler (1971) and Richard Posner (1974), among many others.) The private interest theory of regulation argued that the main beneficiaries of regulation is not the public, but private firms, for whom it serves to restrict competition. A further line of argument, associated with Coase (1960), sought to emphasise that private bargaining and contracts, enforced through courts, can usually more efficiently internalise those externalities (Laffont and Tirole 1993). With efficient courts, there is no rationale for regulation (Posner 1972). A third argument, associated with the public choice school, was that government failure associated with regulation (particularly rent seeking) was much worse than market failure it sought to correct. This questions the assumption that the regulator is necessarily 'benevolent, competent and wise'.

Again, this branch of economic theory and application is a distinct and specialised part of economics – as regulatory economics and the economics of industrial organization. It also has its own culture, models, and history, and ways of seeing and understanding the world.

Monetary economists and regulatory economists are very different animals. They practice a highly specialised and difficult craft, drawing upon different theory, models and traditions, with little overlap between them. This is no less true of the applied policy domains of the conduct of monetary policy and effective regulation.

These two bodies of knowledge and experience can of course be combined in the same agency, but they must reside in different people, and different teams, with different cultures. There is little gain to be had from aggregation, and much mischief to be made from running the two together. An obvious problem with the RBA and its two separate boards is that the same person – the RBA Governor – is chair of both.

A final point to note here is that monetary policy and industrial regulation pursue very different functional objectives. The objective of monetary a policy is macro financial and price stability – as a public good. But payments system regulation is about promoting efficiency and competition, in order to drive out waste and encourage innovation. This is an economizing objective – to promote the efficient use of society's resources. These different objectives have completely different pathways of effect, and completely different measures of success. There is no overlap in the practical prosecution of the tasks of monetary policy and industrial regulation.

Regulation of the payments system rules, including the bank interchange fee, is an issue of industrial organization and competition policy. This is not the RBAs natural domain of competence. Instead, the RBA has a comparative advantage in monetary policy. Australian financial industry would be better served if payments regulation were handed off to a more specialized agency.

4. Competition regulators should not fix market prices

The Australian Competition and Consumer Commission (ACCC) is, because of its specialization in the economics of competition and industrial organization, the appropriate government agency to regulate the payments system in general and bank interchange fees in particular.

Competition regulators are usually mostly concerned with case-by-case rulings with respect to particular policing of anti-competitive practices, such as blocking mergers and acquisitions that create substantial monopoly power, or seeking evidence of collusion toward the same effect. Competition regulators seek to identify and prosecute firm behaviour that weakens competition and therefore threatens to harm consumer interests.

It is rare that this remit extends to endeavours to impose price ceilings (or floors) on what are otherwise market-determined prices. There are of course instances of this, and which are usually associated with producer-initiated lobbying (for example seeking to rule on whether retailer discounting of house-brand milk constituted 'predatory pricing'). There is no theoretical justification for a competition regulator to impose price floors or ceilings, or in any way determine a price that is otherwise competitively set through a process of market discovery. The role of the ACCC is to ensure an institutional environment which competition occurs in order that all relevant information, under competitive bargaining, is expressed in market prices (Hayek 1945).

The ACCC has no position (and nor has the RBA) of superior knowledge from which to advance a true and correct price that the market will not discover itself, if it is free to. Bargaining and economising in the process of competitive price discovery occur on many fronts, including not only matching of product features to segments of consumer demand, but also in finding the optimal specializations and boundaries of firms, across which payments will be made (Williamson 1985). The interchange fee is simply an instance of gains from trade made possible by separation of function between the incentives of acquiring banks and issuing banks in order to maximise the benefit of holding and accepting credit cards to both merchants and consumers (IAEP/ATA 2015).

The interchange fee, then, does not so much need to be regulated as rather demystified. The demand for interchange fee regulation has largely been created out of confusion about the nature of the fee in a competitive market, something the RBAs lack of transparency has exacerbated.

5. On the Issue of Transparency in Bank and Credit Card Fees

A final point to note relates to the issue of consumer-facing transparency in bank fees and credit card fees. The issue of 'hidden fees' has been widely and repeatedly raised as a problem with the private ordering of financial markets, which are thought to be subject to asymmetric information in which consumers know less about the structure of the costs of the financial services they purchase than the suppliers selling these products. The result is sometimes referred to as a "confusopoly", implying that banks and card issuers deliberately create complex information schedules in order to make product-to-product comparisons difficult, and to raise the information costs of switching. This creates rents from imperfect competition.

The credit card interchange fee, which occurs between acquiring bank and issuing bank in a four-party payments system is a good example of a fee that is largely invisible to consumers. This seeming suspicion that merchants and banks are exploiting the hidden nature of the interchange fee to exploit consumers is a major reason for RBA endeavours to regulate and cap the interchange fee.

But the economic theory of information in competitive markets does not support this position. Consumers do not need to see all the costs that go into all of the components of a product. The only information they need is on the attributes of the product, and its total price (Hayek 1945). The price system economises on information, and provided there is competitive entry and exit, there is little to be gained from regulatory requirement to post all input and component prices.

Indeed, there may be substantial costs to this, falling on the consumer. The confusopoly literature (e.g. Kalaychi 2015) points out that this sort of disaggregation of a price into components – for example also observed in phone plans and insurance, does not actually necessarily benefit bounded rational consumers because it creates more information to process, thus raising the cost of comparison. Firms seeking regulatory disclosure are a good example of private interest masquerading as public interest

Furthermore, a credit card, as with most financial products, is a complex commodity with many dimensions of value. The RBA is in no position to observe what consumers value and why – these are subjective preferences.

A more serious issue is the transparency of the RBA's Payments Board. This is a non-minuted society. Its decisions are completely non-transparent. This governance model is for very good reason with respect to monetary policy – namely to ensure effective independence and time consistency. But there is no basic in logic or experience to argue that this secrecy and unaccountability is appropriate for a competition regulator.

6. Summary and recommendations

The Reserve Bank of Australia has two boards: the Reserve Bank Board and the Payments System Board. Our immediate issue is not with the Reserve Bank Board. Rather, our problem is with the second part of its charter – the Payments System Board. The RBA should not be involved in regulating the payments system. They have no comparative advantage in industrial organization and competition policy regulation. The RBA should relinquish control of regulation of the payments system, and hand it to competition regulators, namely the ACCC.

Once this is done, it immediately becomes apparent however that the price-cap on the bank interchange fee, as imposed by the RBA, when translated into the space of the ACCC, is identical to legislatively fixing a market price. This is entirely without economic justification and achieves only political ends. The price-cap should be repealed, and the ACCC should then undertake to demystify, rather than regulate, this efficient value creating market exchange.

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Executive Summary

The Reserve Bank of Australia has been a world leader in interchange fee regulation. In this paper we suggest that this regulatory intervention has been based on wishful thinking at best and represents a failure to understand the actual working of the market economy.

In short, the Reserve Bank of Australia engaged in an extensive regulatory intervention based on poor theory, and no empirical evidence. Theory has not provided an unambiguous indication of market failure, and there is no empirical evidence to support the notion of monopoly pricing – other than a vague notion that interchange fees were "excessive". What the Reserve Bank identified as being "externality" any fair minded observer would label "gains from trade".

We argue that interchange fees are the outcome of an efficient bargaining process given that banks and consumers, and banks and merchants form long term relationships with each other. For as long as there is competition in the banking sector and competition in the retail sector, the interchange fee itself is subject to competitive pressure.

There is no market failure and no economic justification for government intervention. The $13 billion "saving" to merchants that the Reserve Bank identifies following its regulatory reform is simply a redistribution away from consumers (and banks) towards merchants. The Reserve Bank assumes that the saving has been passed onto consumers, but cannot provide any evidence to support that hypothesis.

It is not at all clear that consumers have benefited from interchange fee regulation. To the contrary is likely that consumers are worse off – while merchant fees have declined, so too have the benefits of using credits while the costs (including the interest rate premium over the cash) have increased.

Attachment 3

WHO SHOULD REGULATE BITCOIN?

Challenges and opportunities for blockchain technology in Australia.

Executive Summary

- Bitcoin is a cryptographically-secured internet-based digital currency, or cryptocurrency, that is a leading application of blockchains, or Distributed Ledger Technology (DLT).

- Bitcoin, along with DLT, was invented in 2008, and has since emerged as not only a new form of digital money but as a new, albeit still experimental, payments technology.

- There is growing concern in Australia and around the world over the regulatory implications and challenges surrounding the development and use of this promising new technology.

- Drawing on economic theories of technological change and economic theories of regulation, this report argues that while specialist regulatory agencies should certainly be paying attention to this developing new technology, and actively engaged in learning opportunities wherever possible (such as monitoring industry self-regulation and regulatory sandboxes) it would be premature at this early stage for specialist agencies to regulate the new technology.

- The Reserve Bank of Australia does not have, nor should it have, the technical capabilities in code development or platform design. Indeed the Payments System Board was never well-placed within the Reserve Bank of Australia because of the very different specialisations.

- Instead, specialist regulators should focus attention on particular products or services as they emerge.

- Cryptocurrencies and distributed ledger technologies are a still developing general purpose technology platform with considerable entrepreneurial uncertainty about its use cases, business models, and new capabilities native to the technology, such as smart contracts and distributed autonomous organizations.

- There is a risk that efforts to control the technology as it exists now will impede future blockchain technology innovation and the growth of nascent industries.

- These exciting developments in cryptocurrency as a new technology for payments, and DLT as a general purpose technology, provides another reason why the *Payment Systems (Regulation) Act 1998* should be repealed, and Payment Systems regulation moved to a specialist regulator.

Contents

About the authors

Professor Jason Potts is Professor of Economics in the School of Economics, Finance and Marketing at RMIT University, an Australian Research Council Future Fellow, and also an Adjunct Fellow at the Institute of Public Affairs. He has written five books and over 70 articles on the theory of economic evolution. His work focuses on how entrepreneurship and innovation drive economic growth and development. Jason has published in academic journals such as *Journal of Economic Behavior and Organisation*, *Journal of Institutional Economics*, and *Economic Affairs*.

Dr Trent MacDonald is research fellow in the School of Economics, Finance and Marketing at RMIT University and coordinator of *Melbourne Crypto*, a multidisciplinary, multi-institute research network for 'blockchain studies'. He has worked in the areas of creative city policy, cultural economics, digital inclusion, and the economics of entrepreneurship and innovation. In 2015 Trent won the Don Lavoie Memorial Award from the *Society for the Development of Austrian Economics*.

1. The technology

Bitcoin is an innovative peer-to-peer payment network and a new kind of money—often referred to as a digital currency or cryptocurrency—that offers fast peer-to-peer transactions, global payments, and low processing fees.[1] It uses cryptography to control the creation and transfer of money, and was intended as an electronic payment system that allows two parties to transact directly with each other over the internet without requiring a trusted third-party intermediary.[2]

Bitcoin was invented in 2008 by the pseudonymous Satoshi Nakamoto with the publication of the paper 'Bitcoin: A Peer-to-Peer Electronic Cash System' and was introduced in 2009 as open source software. The project remained largely within the province of a small community of computer scientists and tech-minded activists before reaching mainstream attention following a dramatic price spike (and concomitant uptake in adoption) in late 2013. Today there are hundreds of similar digital currencies, with an aggregate market capitalisation of over $13 billion USD; of which $11 billion USD is dedicated to Bitcoin, exceeding the next largest capitalisation of Ethereum ($860 million USD) by about 13 times.[3]

As the first digital currency,[4] Bitcoin enjoys beneficial network effects that have contributed to its dominance over other digital currencies.[5] For the same reasons, Bitcoin itself has not yet achieved widespread acceptance compared to incumbent fiat currencies.[6] There has, however, been growing venture capital investment in Bitcoin companies, totalling almost $1.4 billion USD from 2012 to 2016.[7] It remains to be seen whether the ongoing entrepreneurial process will be capable of setting in motion a spontaneous monetary switch—or for that matter, whether the range of non-financial applications of the technology will succeed in their respective domains—or whether instead incumbent institutions will maintain their own dominance.[8] Nonetheless, governments and regulators worldwide are carefully considering the implications and challenges presented by the emergence of digital currencies, and Australia is no exception.

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[1] https://bitcoin.org/en/.

[2] Satoshi Nakamoto, 'Bitcoin: A peer-to peer electronic cash system', https://bitcoin.org/bitcoin.pdf (accessed 1 November 2015).

[3] Market capitalization comparisons made as at 1 November 2016. See "Crypto-Currency Market Capitalizations", accessed 1 November 2016, https://coinmarketcap.com/.

[4] Robleh A., Barrdear, Clews, R. and Southgate, J. (2014). The economics of digital currencies. *Quarterly Bulletin*, Bank of England, 54(3), 277- http://www.bankofengland.co.uk/publications/Documents/quarterlybulletin/2014/qb14q302.pdf (accessed 1 November 2015).

[5] White, L. H. (2015). The Market for Cryptocurrencies. *Cato Journal*, *35*, 383-402.

[6] Luther, W. J. (2015). Cryptocurrencies, network effects, and switching costs. *Contemporary Economic Policy*, 34(3), 553-571.

[7] Total reported venture capital in Bitcoin companies was $2 million in 2012, $95 million in 2013, $350 million in 2014, and $550 million in 2015, and $375 million as of September 2016, summing to a little under $1.4 billion in overall investment. See "Bitcoin Venture Capital Investments," *CoinDesk*, accessed 1 November 2016, http://www.coindesk.com/bitcoin-venture-capital/.

[8] Nair, M. and Cachanosky, N. (2016). Entrepreneurship and Bitcoin: Breaking the network Effect. *Review of Austrian Economics*, Forthcoming. Available online: http://link.springer.com/article/10.1007/s11138-016-0348-x.

Digital currencies and Bitcoin

The distinction between digital currencies, such as Bitcoin, and fiat currencies, such as the Australian dollar:

> Digital currency is a digital representation of value that can be digitally traded and functions as (1) a medium of exchange; and/or (2) a unit of account; and/or (3) a store of value, but does not have legal tender status in any jurisdiction. It is not issued nor guaranteed by any jurisdiction, and fulfils the above functions only by agreement within the community of users of the digital currency.
>
> Digital currency is distinguished from fiat currency, which is the coin and paper money of a country that is designated as its legal tender; circulates; and is customarily used and accepted as a medium of exchange in the issuing country.
>
> It is distinct from e-money, which is a digital representation of fiat currency used to electronically transfer value denominated in fiat currency. E-money is a digital transfer mechanism for fiat currency—i.e., it electronically transfers value that has legal tender status.[9]

More specifically, Bitcoin is the world's first completely decentralised, convertible digital currency:

> Bitcoin uses peer-to-peer technology to operate with no central authority or banks; managing transactions and the issuing of bitcoins is carried out collectively by the network. Bitcoin is open-source; its design is public, nobody owns or controls Bitcoin and everyone can take part. Through many of its unique properties, Bitcoin allows exciting uses that could not be covered by any previous payment system.
>
> Bitcoin is a consensus network that enables a new payment system and a completely digital money. It is the first decentralized peer-to-peer payment network that is powered by its users with no central authority or middlemen. From a user perspective, Bitcoin is pretty much like cash for the Internet.
>
> Bitcoin is the first implementation of a concept called "cryptocurrency", which was first described in 1998 by Wei Dai on the cypherpunks mailing list, suggesting the idea of a new form of money that uses cryptography to control its creation and transactions, rather than a central authority. The first Bitcoin specification and proof of concept was published in 2009 in a cryptography mailing list by Satoshi Nakamoto. Satoshi left the project in late 2010 but the open-source nature of Bitcoin mean that its protocol and software are published openly and any developer around the world can review the code or make their own modified version of the Bitcoin software.[10]

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[9] FATF, *Virtual Currencies—Key Definitions and Potential AML/CFT Risks*, 2014, p. 4. http://www.fatfgafi.org/topics/methodsandtrends/documents/virtual-currency-definitions-amlcft-risk.html; see also Attorney General's Department, *Submission 42*, p. 5.

[10] https://bitcoin.org/en/faq#what-is-bitcoin.

Bitcoin currency units can be obtained in exchange for products, services, or other currencies, or in a process called 'mining', in which network participants that provide computing power to verify and record payments into the public ledger are rewarded with transaction fees and newly-minted bitcoins:

> Users send and receive bitcoins using wallet software on a personal computer, mobile device, or a web application. When a Bitcoin user makes a purchase, the payment triggers a broadcast of the financial transaction to the Bitcoin network. The Bitcoin transaction is a digitally signed message transferring the ownership of bitcoins from one "Bitcoin address" to another. For the transaction to take effect it must be recorded in a public ledger or public transaction database called the blockchain. Approximately every ten minutes a bundle of transactions, called a "block", is added to the blockchain. The incentive for this accounting process, known as "mining", carries a reward of 25 bitcoins per block added to the block chain. This 25 bitcoins reward maintains the integrity of the Bitcoin system by allowing the computers that confirm transactions to also mint new bitcoins in the process. Bitcoin payment processing fees are optional, and generally substantially lower than those of credit cards or money transfers.[11]

Blockchains and distributed ledgers

The Bitcoin *blockchain*—the public ledger of transactions, in chronological order, and shared between all users—is a novel solution to the double-spend problem previously plaguing digital currency and e-money. Before Bitcoin, a centralised third party had to issue and reconcile digital cash transactions to prevent electronic cash from being spent multiple times (i.e., because digital assets can be copied). The blockchain is what enables the digital currency to be used in a decentralised payment system, and can therefore be seen as the main technical innovation behind Bitcoin.

Confusion often surrounds the term 'blockchain technology' as it can be used in different ways: to refer to the Bitcoin blockchain, or that of another digital currency, or some other non-financial application such as a platform for smart contracts. A blockchain is a "mathematically-secured, chronological, and decentralised consensus ledger, or database, whether maintained by internet interaction, peer-to-peer network, or otherwise."[12] Most generally, a blockchain is a *distributed ledger*, that is, a list of transactions that is shared among a number of computers, rather than being stored on a central server.[13]

> A distributed ledger is essentially an asset database that can be shared across a network of multiple sites, geographies or institutions. All participants within the network can have their own identical copy of the ledger. Any changes to the ledger are reflected in all copies in minutes, or seconds.[14]

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[11] https://bitcoin.org/en/how-it-works.

[12] Vermont (US, Legislative Code) Rule of Evidence 902 §1913 (2016).

[13] Lewis, A. (2015). A Gentle Introduction To Blockchain Technology, *Brave New Coin*. Available online: http://bravenewcoin.com/assets/Reference-Papers/A-Gentle-Introduction/A-Gentle-Introduction-To-Blockchain-Technology-WEB.pdf.

[14] Walport, M. (2016). Distributed Ledger Technology: Beyond Blockchain. *UK Government Office for Science, Tech. Rep*, *19*.

More specifically, a blockchain is a particular type of distributed ledger (i.e., a cryptographically-secured one), while distributed ledger is a particular type of database (i.e., one maintained on a distributed network of computers). It may therefore seem trivial to point out that distributed ledgers and blockchains stand to compete with, and potential replace, ledgers. But the implication of this is much greater and follows from the fact that modern economies and societies are, ultimately, built upon ledgers:

> A ledger is a way of producing consensus about the facts that are necessary for commerce to function. Ledgers are the basic transactional recording technology at the heart of all modern economies. Moreover, the institutional and organisational outline of a modern economy is to a significant degree a consequence of those ledgers needing to be centralised (i.e., in government, in layers of bureaucracy, in large corporations, and so on). This is why blockchain technology—while still new and experimental—is appropriately described as both a general-purpose technology and a disruptive technology.[15]

Smart contracts and distributed autonomous organisations

A smart contract is a computer protocol that facilitates, verifies, or enforces the performance of a contract. In this way, conventional contractual clauses may be made partially or fully self-executing or self-enforcing (or both). Pioneer of the concept, Nick Szabo, explained how smart contracts might improve traditional contract law:

> A smart contract is a computerized transaction protocol that executes the terms of a contract. The general objectives are to satisfy common contractual conditions, minimize exceptions both malicious and accidental, and minimize the need for trusted intermediaries. Related economic goals include lowering fraud loss, arbitrations and enforcement costs, and other transaction costs.[16]

The second largest digital currency by market capitalisation, Ether, is a cryptographic token used to execute smart contracts on the decentralised applications platform Ethereum.[17] Smart contract applications run on a customised Ethereum blockchain "exactly as programmed without any possibility of downtime, censorship, fraud or third party interference."[18] One such class of decentralised applications are known as Distributed Autonomous Organisations (DAOs), which are self-executing organisations that are governed by smart contract-encoded rules, and maintained on a blockchain.[19]

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[15] Davidson, S., De Filippi, P. and Potts, J. (2016). Disrupting Governance: The New Institutional Economics of Distributed Ledger Technology. Available online: https://ssrn.com/abstract=2811995. On general-purpose technologies see Bresnahan and Trajtenberg (1995), Lipsey et al. (2005). On disruptive technology see Christianson (1997). See also Buterin (2015), Wiles (2015), Tapscott (2016).

[16] Szabo, N. (1994). The idea of smart contracts. Available online: http://szabo.best.vwh.net/smart_contracts_idea.html.

[17] Ether market capitalisation of approximately $860 million USD as at 1 November 2016. See "Crypto-Currency Market Capitalizations", accessed 1 November 2016, https://coinmarketcap.com/. Ethereum was originally crowdfunded via an ether pre-sale in August 2014, raising approximately $18 million USD.

[18] https://www.ethereum.org/. Ethereum was initially described in a white paper by co-founder Vitalik Buterin: https://github.com/ethereum/wiki/wiki/White-Paper.

[19] Buterin (2014a), Wood (2014a).

Thus the vision of Ethereum, while not yet fully realised, can be seen to culminate the above-mentioned shift in foundation of modern economies, from centralised (traditional) ledgers to distributed (blockchain) ledgers, and from centralised institutions to distributed institutions. Which is to say smart contracts and distributed autonomous organisations have the potential to distinguish blockchain as a disruptive, general-purpose *institutional* technology. Indeed, this is implied in Ethereum co-founder Vitalik Buterin's definition and vision of the value of blockchain:

> A blockchain is a magic computer that anyone can upload programs to and leave the programs to self-execute, where the current and all previous states of every program are always publically visible, and which carries a very strong cryptoeconomically secured guarantee that programs running on the chain will continue to execute in exactly the way that the blockchain protocol specifies.
>
> Blockchains are not about bringing to the world any one particular ruleset, they're about creating the freedom to create a new mechanism with a new ruleset extremely quickly and pushing it out. They're Lego Mindstorms for building economic and social institutions.[20]

The emergence of a new general-purpose technology

General-purpose technologies (GPTs) are technologies that pervade entire economies and which have the potential to drastically disrupt incumbent institutions and economic structures. A GPT can be defined as such according to four criteria: (1) it is a single, recognisable generic technology; that (2) initially has much scope for improvement but comes to be widely used across the economy; (3) has many different uses; and (4) creates many spillover effects.[21]

While GPTs can only properly be identified retrospectively, distributed ledger blockchain technology is increasingly understood as a potential new general-purpose technology for a broad range of economic activities that rely on consensus of a database of transactions or records. To call blockchains a new general-purpose technology puts them in the same class of technological trajectories as electricity, transistors, computers, and the Internet. Just as smart phones and mobile media are the 'next generation' from personal computers, blockchains have been represented as the next generation of the Internet.[22] So perhaps the technological impact of blockchains will be similarly large, disruptive and widespread: eventually comparable to computers or the Internet.

> We should think about the blockchain as another class of thing like the Internet—a comprehensive information technology with tiered technical levels and multiple classes of applications for any form of asset registry, inventory, and exchange, including every area of finance, economics, and money;

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[20] Buterin, V. (2015) 'Visions Part I: The value of blockchain technology'. https://blog.ethereum.org/2015/04/13/visions-part-1-the-value-of-blockchain-technology/.

[21] Lipsey, R. G., Carlaw, K. I., & Bekar, C. T. (2005). *Economic transformations: General purpose technologies and long-term economic growth*. OUP Oxford.

[22] Tapscott, D. and Tapscott, A., 2016. *Blockchain Revolution: How the Technology Behind Bitcoin is Changing Money, Business, and the World*. Penguin.

hard assets (physical property, homes, cars); and intangible assets (votes, ideas, reputation, intention, health data, information, etc.).[23]

Blockchains are the technology that underpins digital currencies, but there is a much greater range of applications to any situation involving public records requiring consensus, that are still in nascent stages of exploration and discovery. That is, while the underlying *technical* invention of blockchain has been available since 2009, many applicable *entrepreneurial* opportunities remain unknown and undeveloped.[24] This entrepreneurial process—of discovering the entire constellation of potential opportunities for a technology—is what drives phases of economic growth and productivity.[25]

For blockchain to transform into a GPT it must not only come to be pervasive, but also generate sustained improvements in performance and productivity, and have complementarities with other technologies and sectors.[26] The evolution of blockchain technology has undergone three phases of development:

(1) currency—typified by Bitcoin, digital currencies, and related applications (e.g. currency transfer, remittance, digital payment systems);
(2) contracts—economic, market, and financial applications more extensive than simple cash transactions (e.g. stocks, bonds, futures, loans, mortgages, titles, smart property, smart contracts);
(3) governance—applications beyond currency, finance, and markets (e.g. government, health, science, literary, culture, art).[27]

The more bullish promoters of the technology believe that distributed ledgers could be used to encode, confirm, and transfer almost *all* forms of property:

- Financial: stock, private equity, bonds, derivatives, mutual funds, pensions, crowdfunding
- Public records: land and property titles, vehicle registries, business licences, passports, voter IDs, marriage certificates, death certificates
- Private records: contracts, bets, signatures, wills, trusts, escrows
- Attestation: proof of insurance, proof of ownership, notarised documents
- Physical asset keys: home, hotel rooms, rental cars, car keys, Internet of things
- Intangibles: patents, trademarks, copyrights, reservations, domain names[28]

[23] Swan, M., 2015. *Blockchain: Blueprint for a new economy*. "O'Reilly Media, Inc.".
[24] Allen, D. W. E. (2016). Discovering and developing the blockchain cryptoeconomy. Available online: https://ssrn.com/abstract=2815255.
[25] Helpman & Trajtenberg (1994).
[26] Bresnahan & Trajtenberg (1995).
[27] Swan, M., 2015. *Blockchain: Blueprint for a new economy*. "O'Reilly Media, Inc.".
[28] Swan, M., 2015. *Blockchain: Blueprint for a new economy*. "O'Reilly Media, Inc.".

A cursory examination of the emerging ecosystem of real-world applications of distributed ledgers and blockchain technology confirms that it is certainly a *potential* GPT:

- Coloured Coins: marking or 'colouring' bitcoins in order to represent digital and physical assets on top of the Bitcoin network[29]
- OmniLayer: software layer built on top of the Bitcoin blockchain for creating and trading custom digital assets and currencies[30]
- Counterparty: platform for users to construct self-executing applications and smart contracts using the Bitcoin blockchain[31]
- BitShares: decentralised crypto-equity share exchange[32]
- Ripple: real-time gross settlement system, currency exchange, and remittance network that supports tokens representing fiat currency, cryptocurrency, commodity or other units of value[33]
- Ethereum: distributed computing platform that supports decentralised applications, smart contracts, and distributed autonomous organisations[34]
- OpenBazaar: open source protocol for e-commerce transactions in a fully decentralised peer-to-peer marketplace[35]
- NameCoin: cryptocurrency that acts as an secure, censorship-resistant, decentralised Domain Name System (DNS)[36]
- Ascribe: decentralised platform for managing proof of ownership/provenance of digital content[37]
- MaidSafe: decentralised networking platform for hosting websites and that supports messaging, apps, email, social networks, data storage, video conferencing[38]
- Bitmessage: decentralised, encrypted, peer-to-peer, communications protocol[39]
- Twister: decentralised peer-to-peer microblogging platform (a censorship-proof distributed Twitter clone) based on both BitTorrent and Bitcoin-like protocols[40]

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[29] http://coloredcoins.org/.
[30] http://www.omnilayer.org/.
[31] https://counterparty.io/.
[32] https://bitshares.org/.
[33] https://ripple.com/.
[34] https://www.ethereum.org/.
[35] https://openbazaar.org/.
[36] https://namecoin.org/.
[37] https://www.ascribe.io/.
[38] https://maidsafe.net/.
[39] https://bitmessage.org/.
[40] http://twister.net.co/.

- Storj: platform, cryptocurrency, and suite of decentralised applications that support decentralised cloud storage[41]
- LaZooz: decentralised transportation platform for utilising vehicles' unused space (i.e., ride-sharing)[42]
- Arcade City: Ethereum-based cryptocurrency to facilitate peer-to-peer ride-sharing transactions[43]
- Backfeed: Ethereum-based platform for distributed applications that enable collaborative creation and distribution of value[44]
- Augur: Ethereum-based decentralised prediction market, for trading virtual shares in the outcome of real-world events[45]

It is unavoidable that in the beginning of their technological trajectory general-purpose technologies face radically high uncertainty over what their future valuable applications will be.[46] It does seem reasonable, however, to diagnose blockchain as a generic technology with scope for improvement, many different use cases, and positive externalities among applications. Whether it comes to be widely used across the economy and can be regarded as a GPT will depend on benefits materialising, which also depends on the regulatory environment blockchain entrepreneurs find themselves in. Because it is always *ex ante* unclear as to the entire constellation of potential opportunities stemming from a given technological innovation (even a specific one), the early stages of transformation of general-purpose technologies are particularly conducive to the economic problems of entrepreneurial discovery; which include among them an acute sensitivity and vulnerability to overregulation. At this point in time, the productivity improvements from distributed ledgers blockchain technology are yet to be realised (or even clearly defined), drawing another parallel to previous GPTs such as Information Technology.

Potential risks and concerns for regulators

In addition to the potential benefits of Bitcoin and blockchain, there are some potential risks and concerns to consider for both users and regulators alike. These include price volatility, prudential concerns, security breaches, criminal uses such as illicit trade, money laundering, tax evasion, and terrorist financing, and even the prospect of less effective fiscal or monetary policy. From the outset it should be noted than many of these potential concerns are the same as those facing traditional cash.

After an initial largely dormant period, Bitcoin encountered its first significant price adjustment in April 2013, followed by another major spike in October 2013. There have been a number of similar price adjustments since then, generally resembling the pattern of a speculative bubble: overoptimistic media

[41] https://storj.io/.
[42] http://lazooz.net/.
[43] https://arcade.city/.
[44] http://backfeed.cc/.
[45] https://www.augur.net/.
[46] Bresnahan & Trajtenberg (1995); Helpman (1998); Lipsey et al. (2005).

coverage, entry of novice investors, exuberant price increases leading to overvaluation, and a subsequent downward price adjustment or 'crash'.

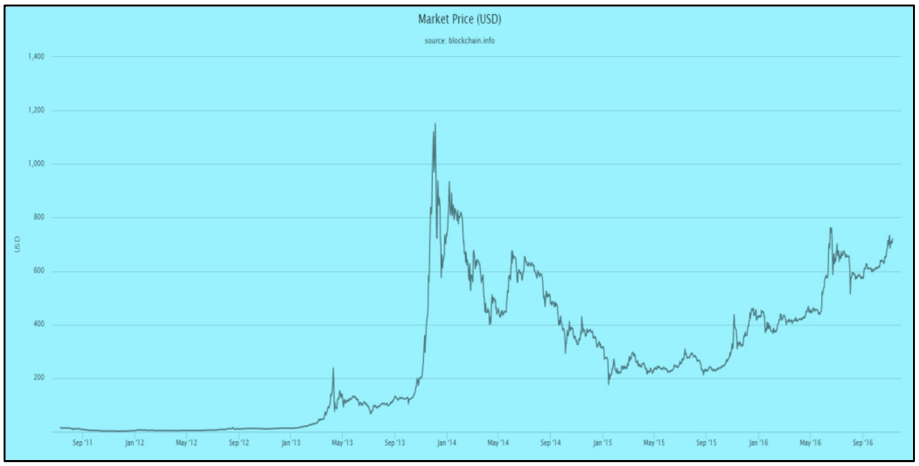

FIG x. Bitcoin market price (USD), Sep 2011 – Sep 2016

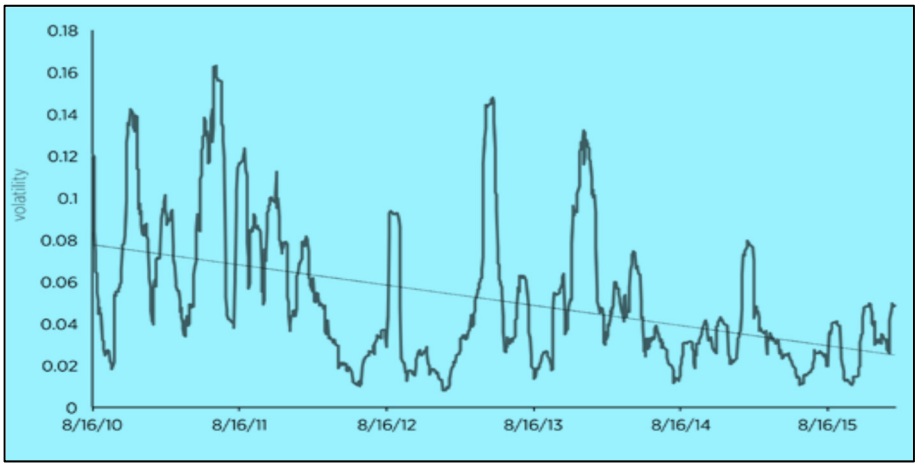

FIG x. Bitcoin price volatility (S.D. of 30-day returns USD), Aug 2010 – Aug 2015

This apparent price volatility[47] has engendered scepticism over the long-term viability of the digital currency, as it undermines its use as a store of value and unit of account. Yet, price volatility is less of a problem for its other primary use as a medium of exchange.[48] Indeed, entrepreneurial solutions, such as *CoinJar*[49], have already been developed to allow merchants and consumers to convert seamlessly between currencies, and thereby support Bitcoin's medium-of-exchange function. This is a likely explanation for why price volatility has not dampened the uptake and acceptance of Bitcoin among merchants. Moreover, price fluctuations have actually *decreased* over time, suggesting that the initial bouts of volatility served to stress test the digital currency, as users have developed more realistic expectations of its function and

[47] In fact, volatility, measured as the standard deviation of daily returns for the preceding 30-day window, appears to be *decreasing* over time. See FIG. x. Dotted line represents linear trend line. Source: Jerry Brito and Andrea Castillo, Bitcoin: A Primer for Policymakers, p. 33.

[48] Jerry Brito, "Why Bitcoin's Valuation Doesn't Really Matter," *Technology Liberation Front*, April 5, 2013, http://techliberation.com/2013/04/05/why-bitcoins-valuation-doesnt-really-matter/.

[49] www.coinjar.com.au.

value, and as entrepreneurs have developed solutions to counteract volatility, such as derivatives and swaps markets.[50]

The threat of security breaches is another concern. While the Bitcoin *protocol* is virtually unhackable, and has to this date proven secure, the same cannot be said of bitcoin *currency units*. Bitcoin wallet software that is used to secure currency units can be hacked if a wallet holder or the provider financial institution engages in poor security management practices—just like traditional bank accounts. That is, if people do no protect their private keys their digital currency can be stolen, or if people misplace or delete them, so too have they lost their digital money—just like with traditional money. Moreover, if the cryptographic tools that underwrite the security of Bitcoin are found to be vulnerable to hacking attempts, then many more industries and technologies beside Bitcoin will likewise be vulnerable—including traditional financial institutions.

While the Bitcoin protocol itself is secure, inevitably some third party intermediaries that hold or convert the digital currency, such as wallet providers and currency exchanges, are not. Examples range from the negligent to the outright fraudulent. In December 2014 the widely trusted *Blockchain.info* service was exposed of security vulnerabilities by a 'white hat' hacker (a Good Samaritan that later returned the stolen funds) and promptly strengthened its security measures. In November 2013 the first and largest bitcoin exchange Mt. Gox, then managing around 70 percent of Bitcoin transactions, began delaying customer withdrawal requests and in February 2014 filed for bankruptcy, citing an 850,000 BTC ($473 million USD) hack.[51] As of 2016 over 24,000 Mt. Gox customers have made claims for reimbursement, with a mere $90 million USD of the digital currency in holding.[52] In other cases, exchanges have responded to incidents responsibly and reimbursed the full value of customers' hacked accounts.

Bitcoin services today take proactive measures to demonstrate the integrity of their business, and alleviate security or prudential concerns of prospective customers: for example, Coinbase[53] prominently publicises its account security insurance policies, while Kraken[54] undertakes third-party audits of its bitcoin reserves. Through an entrepreneurial process, the industry has solved many of the problems with digital currency, through efforts to assure customers their obligations will be met, or indeed through innovations that allow individuals to control their bitcoin holdings directly. Until this point, security and prudential concerns have been addressed though entrepreneurship and innovation, not regulation.

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[50] Professional, regulated bitcoin derivatives and swaps markets are emerging around the world; examples include *TeraExchange* in the US (teraexchange.com), *Crypto Facilities* in the UK (cryptofacilities.com), and *BitMEX* in HK (bitmex.com).

[51] Paul Vigna, "5 Things about Mt. Gox's Crisis," *Wall Street Journal*, February 25, 2014, http://blogs.wsj.com/briefly/2014/02/25/5-things-about-mt-goxs-crisis/.

[52] Jon Russell, "Mt. Gox Customers Can Now File Claims for Their Lost Bitcoins," *TechCrunch*, April 22, 2015, http://techcrunch.com/2015/04/22/mt-gox-claims/.

[53] Nermin Hajdarbegovic, "Coinbase Names Aon as Its Bitcoin Insurance Broker," *CoinDesk*, August 28, 2014, http://www.coindesk.com/coinbase-names-aon-bitcoin-insurance-broker/.

[54] Nermin Hajdarbegovic, "Kraken Bitcoin Exchange Passes 'Proof of Reserves' Cryptographic Audit," *CoinDesk*, March 24, 2014, http://www.coindesk.com/krakens-audit-proves-holds-100-bitcoins-reserve/.

Related to security, is the issue of irreversibility of transactions on blockchains and the difficulty in repairing bugs in a protocol's code. An example of this can be found in *The DAO*, a distributed autonomous organisation for venture capital funding that was created on the Etheruem smart contract platform. *The DAO* received $160 million USD in crowdfunding upon its launch in June 2016 and promptly suffered a $50 million USD hack that exploited security vulnerabilities in its code. Bug fixes would be trivial to implement in a centralised code, but corrections to a distributed autonomous organisation are incredibly difficult to make once the system is in use. For *The DAO* this would have required a moratorium on its operation so that new code could be written, and agreement by participants to migrate funds to the new system. Stakeholders in *The DAO* could not reach such an agreement—some believed the hack was in fact a legitimate use of funds, given the poorly written code. In July 2016, after much debate, the decision was made by the encompassing Ethereum community to effectively exercise its higher-level authority to veto *The DAO*. The Ethereum blockchain on which *The DAO* existed was 'hard forked' so that a second version of the blockchain (dated prior to the hack and with updated code) came into existence, and virtually all the diverted funds were restored to their original contracts in the new blockchain. This is a notorious and somewhat ambiguous example of the potential perils of blockchain smart contract—both as a warning to what can go wrong when a new technology is tested in an unregulated environment *and* as an exemplar of the self-regulating potential of blockchains, i.e., an entrepreneurial private governance solution to public harm.

Another concern of policy makers and regulators relates to the pseudonymity of digital currencies and associated applications built by blockchain technologies. Indeed, *just like with traditional money*, pseudonymity generally does confer an ability on criminals to engage in money laundering and illicit trade—more particularly, it has facilitated the rapid expansion of online drug markets. The most illustrious example of this is the deep web black market, or cryptomarket, known as *Silk Road*. The pseudonymous character of Bitcoin (along with the anonymising networking software *Tor*) enables vendors and consumers to openly defy prohibition and participate in a vast transnational digital marketplace of illicit goods and services. *Silk Road* was eventually shut down by authorities following the arrest of its founder Ross Ulbricht in late 2013, but studies have estimated a monthly transaction volume of approximately $1.2 million USD during its February 2011 to October 2013 operation.[55]

Moreover, due to the open-source nature of the underlying technologies, the *Silk Road* prototype has been replicated many times (including its reincarnation *Silk Road 2*) and today there are dozens of competing marketplaces, making the overall cryptoeconomy much more robust than even the heyday of the original *Silk Road*. A survey of the 35 largest cryptomarkets found that between 2013 and 2015 total sales volumes fluctuated between $100 million USD and $180 million USD, even despite major setbacks like

[55] Nicolas Christin, *Traveling the Silk Road: A Measurement Analysis of a Large Anonymous Online Marketplace* (Carnegie Mellon CyLab Technical Report CMU-CyLab-12-018, July 30, 2012, revised November 28, 2012), http://www.cylab.cmu.edu/files/pdfs/tech_reports/CMUCyLab12018.pdf. Alternative citation: Christin, N. (2013, May). Traveling the Silk Road: A measurement analysis of a large anonymous online marketplace. In *Proceedings of the 22nd international conference on World Wide Web* (pp. 213-224). ACM: https://arxiv.org/pdf/1207.7139.pdf.

thefts, scams, takedowns, and arrests during the period.[56] The next generation of cryptomarkets, such as *OpenBazaar*, not only transact in digital currencies but also employ related technologies in their very marketplace infrastructure, meaning they are increasingly difficult for authorities to suppress or takedown.[57]

While it is clear that a number of harms can be associated with cryptomarket-enabled illicit trade, from a regulation policy perspective the more relevant question is a comparative institutional one. In the context of illicit drug trade, do cryptomarkets present a more or less harmful alternative to conventional drug distribution mechanisms?[58] It is apparent that for consumers the benefits of cryptomarkets outweigh the harms: despite asymmetric information problems and the threat of fraud, reputation acts as a sufficient self-enforcement mechanism to support transactions, users are able to avoid the risk of physical violence in physical street-based drug markets, and competition has increased the choice, quality, safety, and value of products and services.[59] Furthermore, when forming public policy, it is important to appreciate that illicit trade using digital currency, though not negligible, is still meager relative to the size of both the black market and digital currency economies.[60]

Likewise, the concern that digital currencies might be used to launder money or finance terrorism is rather more theoretical than empirical at this time. Digital currencies could indeed be used for these activities, but due to the fact that most are pseudonymous at best—because they provide public records of all transactions—the risk of laundering money or financing terrorism with digital currency is much higher than is commonly appreciated. Transaction records will always be public and accessible by law enforcement, meaning that if a connection between Bitcoin addresses and identities can be established, criminals would actually be more easily prosecuted than if they had transacted in traditional cash.

Moreover, several bitcoin exchanges have voluntarily complied with anti-money laundering and counter-terrorist financing (AML/CTF) and 'know your customer' (KYC) record-keeping and reporting requirements. Making such requirements mandatory and comprehensive would thus make digital currency even less attractive for these activities, but care should be given not to overregulate as this could serve only to inhibit legitimate business without a concomitant disincentive to criminal activities. In a sense the genie is already out of the bottle, as drug dealers, money launderers, and terrorists have the option of bypassing

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[56] Ibid. For more detail, *The Economist* has extracted data from around 360,000 sales between December 2013 and July 2015 on the tree largest cryptomarkets (Agora, Evolution and Silk Road 2): http://www.economist.com/news/international/21702176-drug-trade-moving-street-online-cryptomarkets-forced-compete. See also, the September 2016 special issue of the International Journal of Drug Policy on drug cryptomarkets http://www.ijdp.org/issue/S0955-3959%2816%29X0012-6.

[57] OpenBazaar fashions itself as a decentralised network for peer-to-peer commerce online with no fees and no restrictions, in opposition to centralised incumbents e.g. Silk Road and Amazon: https://openbazaar.org/.

[58] Martin, J. (2014). *Drugs on the dark net: How cryptomarkets are transforming the global trade in illicit drugs*. Springer.

[59] Hardy, R. A., & Norgaard, J. R. (2015). Reputation in the Internet black market: an empirical and theoretical analysis of the Deep Web. *Journal of Institutional Economics*, 1-25. See also Martin (2014) and International Journal of Drug Policy, September 2016.

[60] Jerry Brito, "*National Review* Gets Bitcoin Very Wrong," *Technology Liberation Front*, June 20, 2013, http://techliberation.com/2013/06/20/national-review-gets-bitcoin-very-wrong/.

exchanges by purchasing digital currency units directly from individual holders. The challenge for policy makers and regulators is to develop oversights that satisfy their concern for criminality without overburdening legitimate activities and discouraging the benefits of digital currency.

2. The regulatory framework

Regulation is ubiquitous in our economies and societies. Governments, and their many agencies, use regulations to implement laws and legislation and achieve their policy objectives. Essentially they are standards or instructions that attempt to delimit what individuals and organisations are permitted or prohibited from doing. Regulation defines the boundaries of economic activity by attempting to modify or limit, but not outlaw.

The simplest economic approach to regulation is cost-benefit analysis. Social benefits are provided when the legal and regulatory framework establishes and enforces property rights and addresses market failures in a way that is comparatively efficient. Social costs are imposed when regulations undermine economic efficiency by diverting resources from otherwise productive private sector activity. According to this framework, regulation should happen when the net social benefit is greater with than without regulation. Yet in practice this seemingly simple cost-benefit calculus is problematic, due to the enormous difficulty in measuring the social costs and benefits of alternative regulatory policy approaches.

Why regulate and why not regulate?

The regulator's task is even more difficult when new technologies such as digital currencies and blockchains are the subject of analysis. The regulatory framework must ensure that it manages any risks that might arise from technological change without stifling innovation. For blockchain, the costs of overregulation could be even greater given its potential status as a general-purpose technology. The regulatory stance taken on a fledgling GPT may seem appropriate at a current moment (i.e., if it passes a net-beneficial cost-benefit calculus) only to be revealed in hindsight to have been over-burdensome. Put another way, the benefits associated with ameliorating the risks and concerns of consumers, policymakers, and regulators *today* could pale in comparison to the foregone benefits that would have otherwise eventuated *tomorrow*, if not for the regulation. Because blockchain is a potential-GPT, extra care should be taken not to sacrifice a dynamically efficient regulatory response (generally more permissive) for a statically efficient (and generally more restrictive) innovation-regulation trade-off.

The structure and shape of the new economies and opportunities afforded by blockchain technology—and the improvements in performance, productivity, and economic growth that come with them—remain shrouded in uncertainty. The only way to discover this information is through entrepreneurial endeavour in markets. There is a very real likelihood that excessive regulation on early-phase entrepreneurial firms, and particular on those engaged with new technologies such as Bitcoin and blockchain, places a significant burden upon innovative practices and structures. What is needed in Australia is a permissionless innovation approach: where entrepreneurs are left free to test, trial and experiment with these technologies. The Productivity Commission recently reached a comparable conclusion about the role of government in the face of potentially disruptive technological change:

> The pace of change has implications for how governments undertake regulatory functions. Some regulations and regulatory approaches are explicitly preventing the development and efficient

adoption of technologies. In principle, governments should adopt a 'wait and see' approach to new business models and products rather than reacting quickly to regulate what may be unrealised risks.[61]

The permissionless innovation, 'wait and see' regulatory approach would represent a change of practice in Australia; the economy is heavily burdened by regulatory controls.[62] The Australian government has a long and poor history of stifling innovation through regulation. Examples of benign technological innovations that were delayed by excessive regulation in Australia include FM radio and pay television, and more recently somewhat more contested innovations in the sharing economy AirBnB and Uber have had to cope with substantial regulatory uncertainty.[63]

The arguments *for* regulation are well known; counter-arguments *against* regulation, less so. The "public interest" theory of regulation acknowledges that markets are generally efficient at allocating scarce resources to their best uses, but suggests that government intervention may improve (maximise) social welfare, and thereby serve the public interest, by correcting for market failures (e.g. externality, public good, monopoly, or asymmetric information). Yet many regulations—such as those that inhibited FM radio, pay television, and ridesharing—do not correspond to identifiable market failures.

Countervailing views of regulation comes from the Chicago and Public Choice schools of economics, and generally caution that regulation is susceptible to being introduced and implemented so that it furthers the private interest of individuals and organisations rather than the public interest of the community. The "capture theory" of regulation is that politicians and regulators end up being 'acquired' by special interests, usually the organisations they are intended to regulate. The result is that new regulations benefit incumbent market players by presenting barriers to entry for new competitors. Along similar lines, George Stilgler's "Economic Theory of regulation" states that the effect of regulation is akin to wealth transfer, and that it is likely to be biased toward benefiting small well-organised interest groups with strong preferences at the expense of large interest groups with weak preferences. Public choice theory identifies 'rent-seeking' with the economic waste involved in privately interested regulation; and argues that because regulators cannot always predict the consequences of their interventions they may unintentionally produce even worse outcomes than the market failure status quo (i.e., "government failure" or "regulator failure").

Because blockchain is a disruptive, general-purpose technology it is likely to exert pressures on several less efficient incumbent competitors and industries. This gale of creative destruction is set to initiate a "process of industrial mutation that incessantly revolutionizes the economic structure from within, incessantly destroying the old one, incessantly creating a new one." In the face of this disruptive

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[61] Productivity Commission. (2016). Digital Disruption: What Do Governments Need To Do? Available online: http://www.pc.gov.au/research/completed/digital-disruption.

[62] Berg, C. (2008). The Growth of Australia's Regulatory State: Ideology, accountability and the mega-regulators. *Institute of Public Affairs, Australia.* Available online: http://ipa.org.au/publications/980/the-growth-of-australia's-regulatory-state-ideology-accountability-and-the-mega-regulators.

[63] Allen, D., & Berg, C. (2014). The sharing economy. How over-regulation could destroy an economic revolution. *Institute of Public Affairs, Australia.* Available online: http://www.ipa.org.au/publications/2312/the-sharing-economy-how-over-regulation-could-destroy-an-economic-revolution/pg/2.

potential there is a significant threat that regulations will be used to protect private, rather than the public, interest. If regulations impose onerous costs on early-phase entrepreneurship they will effectively erect entry barriers around incumbent industries and the gale of creative destruction will be but a breeze. To encourage the growth of the nascent industries surrounding digital currency and blockchain, regulators should encourage bottom-up, organic, self-regulating institutions prior to introducing top-down government control. The huge potential benefits will only come to fruition if entrepreneurs are able to experiment, expand, and evolve in a flexible environment without unnecessary or onerous regulation.

Regulatory challenges

Current law and regulation does not easily apply to technologies like Bitcoin, because it "does not exactly fit existing statutory definitions of currency or other financial instruments or institutions, making it difficult to know which laws apply and how."[64] Digital currencies and other innovations based on blockchain technology can look like an electronic payments system, a currency, and a commodity, among other things. This situation is reminiscent of the regulatory uncertainty that has accompanied other new technologies, especially new GPTs.

While digital currencies and blockchain technology have generated a great deal of innovation and experimentation, they also raise significant regulatory and policy challenges. These stem from three sources: decentralisation, globalisation, and uncertainty. The first is the decentralised, open-source, and unregulated nature of the underlying blockchain protocol. The second is the digital, and therefore global, nature of the innovation in general and the emerging industries in particular. The third is the uncertain nature of innovation and transformation of general-purpose technologies

It is practically impossible to regulate blockchain *technology* itself, though it is of course possible to regulate the organisations that use the technology, once they bring products and services to markets within the physical jurisdiction of Australian regulators. One cannot regulate the technology of 'the wheel', but one can regulate businesses that use cars and trucks (i.e., the idea of the wheel) to do business. Bitcoin expert Andreas Antonopoulos made this point when he told the Australian Senate Inquiry into Digital Currency "regulation of the protocol itself is not really possible at this time."[65] Blockchain technology developer Ripple Labs also noted "as pure technologies, these protocols cannot themselves be regulated. However, the entities that make use of the protocols to buy, sell, or exchange those virtual or fiat currencies can be subject to regulation."[66] PayPal further elaborated:

> While the currency itself should not be regulated, and transactions by individual users without the assistance of intermediaries should not be regulated, companies that provide a financial service for digital currency transmission, for issuance or sale of digital currency, or for exchange with other currencies such as the Australian Dollar, should be regulated in a manner similar to the existing regulations that apply to other payment services. Those regulations, however, should be adapted to

[64] Brito and Castillo, Bitcoin: Primer for Policymakers.

[65] Mr Andreas Antonopoulos, *Committee Hansard*, 4 March 2015, p. 5.

[66] Ripple Labs, *Submission 21*, p. 3.

> recognise the specific details of how different digital currencies work, particularly 'decentralised' digital currencies that are not controlled by a specific issuer.[67]

Digital currency and blockchain technology is developing within a digital, and therefore global, innovation system. This means that the threat of global innovation arbitrage—the seeking out of different jurisdictions with more favourable and certain regulatory rules—presents another challenge to regulators. Policymakers may need to adopt a commitment to "permissionless innovation" instead of the "precautionary principle" (i.e., constrain innovation until its potential harms are well understood) approach to innovation-regulation. Permissionless innovation advocates implementing bottom-up self-regulation as the default policy mechanism, in which:

> experimentation with new technologies and business models should generally be permitted by default. Unless a compelling case can be made that a new invention will bring serious harm to society, innovation should be allowed to continue unabated and problems, if they develop at all, can be addressed later.[68]

Indeed, ASIC has intimated that regulatory arbitrage challenges their ability to subsume digital currency within the financial services regulatory regime. If compliance costs were too burdensome for digital currency trading platforms it would encourage them to move offshore:[69]

> The difficulty in regulating the trading platforms like traditional markets is that the compliance obligations that are associated with running a traditional financial market are quite high. The bar is set quite high. I think it is likely that if you were simply to apply the existing framework to platforms that sell digital currency, most would find it uneconomic to sustain in Australia. And because the market for these bitcoins is global, a lot of that activity would move offshore and Australian consumers would probably still end up being able to speculate with digital currency by buying and selling on foreign trading platforms.[70]

There is a lot of uncertainty surrounding digital currency and blockchain as "we are dealing with a very disruptive and fast-moving technology that has only recently emerged into the limelight"[71] According to Antonopoulos: "We do not really know where Bitcoin will be in a couple of years … There are many unanswered questions at the moment." If global experts have yet to fully appreciate the nuances of the technology (not to mention entrepreneurs that possess intimate and tacit knowledge of it) how can regulators presume to know the most appropriate regulatory framework? Put simply, regulators suffer from a knowledge problem, and the knowledge deficit is compounded by the general-purpose nature of blockchain technology. The Australian Payments Clearing Association believes there to be a "striking" lack

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[67] PayPal, *Submission 45*, p. 9.

[68] Adam Thierer. Permissionless Innovation: The Continuing Case for Comprehensive Technological Freedom. Mercatus Centre, George Mason University: 2014.

[69] Australian Securities and Investments Commission, *Submission 44*, p. 23.

[70] Mr Michael Saadat, Australian Securities and Investments Commission, *Committee Hansard*, 7 April 2015, p. 38.

[71] Mr Andreas Antonopoulos, *Committee Hansard*, 4 March 2015, p. 6.

of information about the levels of activity in digital currencies and suggests that additional research in this area is required.[72] Ripple Labs is of the same view, arguing that the actual risks and opportunities presented by different digital currency businesses should be clarified before regulation proceeds.[73]

Current regulatory conversation in Australia

The three sources of difficulty for regulators—decentralisation, globalisation, and uncertainty—are evident in the current conversation between regulators and innovators in Australia. Two government inquiries in recent times have been the forum for such conversations: the Treasury Financial System Inquiry (FSI) in 2014[74] and the Senate Digital Currency Inquiry (DCI) in 2015-16.[75] While only tangentially related to digital currency, the FSI found that:

> Digital currencies are not currently widely used as a unit of account in Australia and as such may not be regarded as 'money'. However, their use in payment systems could expand in the future. It will be important that payments system regulation is able to accommodate them, as well as other potential payment instruments that are not yet conceived. Current legislation should be reviewed to ensure payment services using alternative mediums of exchange can be regulated—from consumer, stability, competition, efficiency and [anti-money laundering] perspectives—if a public interest case arises.[76]

The Financial System Inquiry supported broadening regulation to include digital currency, but also recommended graduated regulation in order to "enable market entry and ensure regulation is targeted to where it is most needed." The FSI concluded that while graduated regulation "may increase risks for some consumers, it is expected to improve consumer outcomes overall."[77]

In October 2014, the Senate referred the matter of digital currency to the Economics References Committee for inquiry. This was a much more comprehensive investigation, seeking to examine:

> (a) how to develop an effective regulatory system for digital currency that:
>
> (i) ascertains the most appropriate definition of digital currencies under Australian tax law,
>
> (ii) promotes competition and growth of the digital currency industry,
>
> (iii) ensures ongoing stability in the financial services industry,
>
> (iv) secures protection of consumers and businesses against illegal activity,

[72] Mr Christopher Hamilton, Australian Payments Clearing House, Committee Hansard, 7 April 2015, p. 2.
[73] Ripple Labs, *Submission 21*, p. 13.
[74] The Treasury, 'Financial System Inquiry Final Report', 7 December 2014, http://treasury.gov.au/ConsultationsandReviews/Consultations/2014/FSI-Final-Report (accessed 30 October 2015).
[75] Citation for the Senate Inquiry into Digital Currency.
[76] The Australian Government the Treasury, *Financial System Inquiry: Final report*, November 2014, p. 166.
[77] The Australian Government the Treasury, *Financial System Inquiry: Final report*, November 2014, p. 146.

(v) incorporates digital currencies into Australia's national security framework, and

(vi) ensures the financial stability of the industry;

(b) the potential impact of digital currency technology on the Australian economy, including the:

(i) payments sector,

(ii) retail sector, and

(iii) banking sector;

(c) how Australia can take advantage of digital currency technology to establish itself as a market leader in this field; and

(d) any other related matters.[78]

Lack of regulatory clarity

The Digital Currency Inquiry came at a crucial point in the emergence of blockchain technology, giving experts, entrepreneurs, and regulators the opportunity to share views on how best to support innovation and address the needs of the nascent Australian digital currency industry. There is a view that whether the technology succeeds no longer depends on technical or economic viability (which by now has already proven to be sustainable) but rather will depend on the ability of the industry to operate in a more regulated framework. Which is to say "a well designed and proportionate legal and regulatory regime will support user confidence in, and therefore growth of, innovative payment systems such as virtual currencies."[79]

For the entrepreneurs, the primary concern was a perceived lack of regulatory clarity. PayPal, an online payments service, explained that this factored into its decision not to add Bitcoin as an additional type of currency in the PayPal wallet.[80] According to Australian company CoinJar "much of the uncertainty faced by digital currency companies is not the absence of a rulebook, but rather an abundance of possible existing rulebooks and no clarity on which one will ultimately apply."[81] Another submission (name withheld) explained that Australian banks had "uniformly turned down any involvement with our company, citing the regulatory restraints imposed by the Australian government."[82] Indeed, access to banking services, and other associated business partners, was a common concern among entrepreneurs. The Bitcoin Foundation and Bitcoin Association of Australia[83] and The Melbourne Bitcoin Technology Center[84] both noted that their

[78] *Journals of the Senate*, No. 59, 2 October 2014, pp. 1583–1584.

[79] Dr Rhys Bollen, *Submission 46*, p. 37.

[80] PayPal, *Submission 45*, p. 7.

[81] CoinJar, *Submission 12*, p. 5.

[82] Name withheld, *Submission 2*, p. [1].

[83] Bitcoin Foundation and Bitcoin Association of Australia, *Submission 13*, p. 20.

[84] Melbourne Bitcoin Technology Center, Submission 36, p. [2].

members had experienced discrimination and refusal of service due to a "Blanket classification of all bitcoin businesses and users as 'high risk' customers."

The Australian Securities and Investment Commission (ASIC) noted that it was "aware of a number of banks taking steps to cease dealing with Bitcoin related businesses due to concerns that digital currency providers pose an unacceptable level of risk to the banks' business and reputation." The main reason for this appears to be uncertainty surrounding the Anti-Money Laundering and Counter-Terrorism Financing (AML/CTF) Act, as Westpac explained:

> From the point of view of a bank that is providing banking services, if we cannot satisfy ourselves that we can do all the things that we have to do under the legislation to understand the nature of the transactions and what is going on there, it puts us in a very difficult position to be able to provide those banking services. The issues are particularly intense when it comes to moving payments internationally, because obviously we have counterpart banks to deal with globally and they have got their own anti-money laundering, counter-terrorism-finance obligations, and they will expect us to understand the nature of the payments as well.[85]

Essentially, banks find themselves in a vulnerable position when offering designated services to digital currency businesses. Clarifying the regulatory framework that blockchain businesses operate within, particularly with regards to anti-money laundering and 'know your customer' requirements, will help bridge this impasse.

Reserve Bank of Australia (RBA)

Since 1959 the Reserve Bank of Australia has occupied dual statutory functions in: (1) the central bank role of the setting and conduct of monetary policy, including ancillary roles of banknote provision and banking services to the Federal government; and (2) the regulation of the payments system. The RBA's general regulatory approach under the *Payment Systems (Regulation) Act 1998* (PSRA) relies principally on "industry- or market-driven solutions", intervening only when necessary on the grounds of its "responsibility for efficiency and competition in the payments system and controlling systemic risk." It would then seem reasonable that the RBA should regulate Bitcoin and other digital currencies in its second role overseeing the payments system. Indeed, the Governor of the RBA, Glenn Stevens, recently reported "the Board and Bank staff also pay close attention to new technologies, including distributed ledger technologies and other forms of 'fintech', which have the potential to significantly change the payments landscape."[86]

The RBA recognises that the emergence of digital currencies and blockchain technology represents a "fundamental change" to payments and notes that the "use of these systems in Australia has been

[85] Dr Sean Carmody, Westpac, *Committee Hansard*, 7 April 2015, p. 22.

[86] RBA Payment Systems Board Annual Review 2016: http://www.rba.gov.au/publications/annual-reports/psb/2016/pdf/2016-psb-annual-report.pdf. Governor's Foreword (p. 3).

extremely limited, but the underlying techniques may find greater use in the years to come."[87] The RBA considers that at this point in time digital currencies do not yet raise any significant concerns with respect to competition, efficiency or risk to the financial system; and are not currently regulated by the RBA or subject to regulatory oversight.[88] If and when the RBA does, however, decide that digital currency and blockchain applications represent a stability issue, it will certainty have authority to designate and regulate over them.[89]

Australian Securities and Investments Commission (ASIC)

The Australian Securities and Investment Commission (ASIC) enforces company and financial services laws to protect consumers, investors and creditors. As such, ASIC might also have remit to regulate digital currencies and blockchain innovations if they can be defined as 'financial products.' Under the current *Corporations Act*, a financial product is a facility through which a consumer "(a) makes a financial investment (b) manages financial risk; or (c) makes non-cash payments."[90] During the 2014 Parliamentary Joint Committee on Corporations and Financial Services, ASIC announced its approach to digital currency:

> ASIC monitors new developments in the marketplace and, accordingly, ASIC is considering whether and how the legislation it administers, such as the Corporations Act, applies to virtual currencies.
>
> ASIC's view is that Bitcoins themselves (and other virtual currencies) are not financial products and are not regulated under the legislation we administer.[91]

This means that "a person is not providing financial services when they operate a digital currency trading platform, provide advice on digital currencies or arrange for others to buy and sell digital currencies."[92] As such they do not require:

(a) an Australian market licence to operate a digital currency trading platform; and

(b) an Australian financial services (AFS) licence in order to:

(i) trade in digital currency;

(ii) hold a digital currency on behalf of another person;

(iii) provide advice in relation to digital currency; and

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[87] Review of Card Payments Regulation – Issues Paper. Available online: http://www.rba.gov.au/payments-and-infrastructure/review-of-card-payments-regulation/review-of-card-payments-regulation-issues-paper.html.

[88] Reserve Bank of Australia, Submission 19, p. 9; Dr Anthony Richards, Reserve Bank of Australia, *Committee Hansard*, 7 April 2015, p. 45.

[89] Mr Christopher Hamilton, Australian Payments Clearing House, *Committee Hansard*, 7 April 2015, p. 7.

[90] Australian Securities and Investments Commission, *Submission* 44, p. 8.

[91] Parliamentary Joint Committee on Corporations and Financial Services, *Statutory Oversight of the Australian Securities and Investment Commission, the Takeovers Panel and the Corporate Legislation Report No. 1 of the 44th Parliament*, November 2014, p.25.

[92] Australian Securities and Investments Commission, *Submission* 44, p. 11.

(iv) arrange for others to buy and sell digital currency.[93]

However, this is not the end of the story. Even though digital currency does not fit within the definition of a financial product, if a currently regulated financial services provider was to expand its product offerings into digital currencies, these products *would* be considered financial products. The same would be true conversely if a digital currency business was also providing a facility that qualified as a financial product.

> A digital currency, in and of itself, is not a financial product. Providing advice about a digital currency is not financial product advice, buying and selling digital currency means you are not making a market in a financial product. But some ancillary services you might provide that are associated with digital currencies could be regulated by ASIC.[94]

For example, when PayPal entered into an agreement with Bitcoin payments processors Bitpay, Coinbase and GoCoin (to enable its merchants to accept Bitcoin) it had to comply with the usual financial services licensing, conduct, and disclosure obligations for financial products in the Corporations Act.[95]

Recall also that digital currency is but one application of blockchain technology, and some other blockchain applications—as well as other facilitates associated with digital currencies—might fall within the definition as financial products.[96] The upshot is that because entrepreneurs do not yet know all the applications of the technology, ASIC does not know, and cannot say, whether future innovations will qualify as financial products and be subject to their regulatory requirements. It does seem likely, however, that some classes of blockchain innovations will meet this condition and therefore that ASIC will have some regulatory role. But because neither ASIC nor the public yet have this knowledge, we are left at another impasse of entrepreneurial and regulatory uncertainty.

Australian Competition and Consumer Commission (ACCC)

The Australian Competition and Consumer Commission (ACCC) has the responsible of ensuring that individuals and businesses comply with Australian competition, fair trading, and consumer protection laws—in particular the *Competition and Consumer Act*. These general consumer protection provisions state that businesses must not make false or misleading representations or engage in unconscionable conduct.[97]

While ASIC does not consider digital currencies to be a financial product for the purposes of the Corporations Act or the ASIC Act, the consumer protection obligations of the *Competition and Consumer Act* do apply to digital currencies. They would also likely apply to all manner of new product and service innovations that are derived from blockchain technology.

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[93] Australian Securities and Investments Commission, *Submission 44*, p. 3.

[94] Mr Michael Saadat, Australian Securities and Investments Commission, *Committee Hansard*, 7 April 2015, p. 43.

[95] Australian Securities and Investments Commission, *Submission 44*, p. 15.

[96] Australian Securities and Investments Commission, *Submission 44*, p. 11.

[97] Australian Securities and Investments Commission, *Submission 44*, p. 8.

Australian Transaction Reports and Analysis Centre (AUSTRAC)

Australian Transaction Reports and Analysis Centre (AUSTRAC) is an Australian government financial intelligence agency set up to combat money laundering, organised crime, tax evasion, welfare fraud and terrorism. It does this under the *Anti-Money Laundering and Counter-Terrorism Financing Act 2006* (AML/CTF Act).

In late 2015, during the Parliamentary Joint Committee on Law Enforcement inquiry into financial related crime[98], the Australian Crime Commission (ACC) said in relation to Bitcoin and financial crime:[99]

> The anonymity that this process affords, and the ease with which virtual currencies can be exchanged within and across borders, make them attractive to serious and organised crime. Virtual currencies are also attractive to individuals seeking to engage in criminal activities and the 'darknet', such as the former Silk Road, which relied solely on Bitcoin for the trade in illicit goods, including illicit drugs.[100]
>
> Although virtual currencies such as Bitcoin are seen as vulnerable for exploitation by organised crime seeking to facilitate money laundering activities, evidence that this is occurring on a large scale is yet to be identified.[101]

The AML/CTF Act defines e-currency as "an internet-based, electronic means of exchange that is… backed either directly or indirectly by precious metal or bullion or a thing of a kind prescribed by the AML/CTF Rules." This means the majority of digital currencies—including Bitcoin—are not currently covered under the Act because most are not backed by precious metal or bullion. This exception also extends to most other non-currency applications of blockchain technology as well. AUSTRAC could however exercise authority over digital currency and blockchain applications using the 'thing of a kind prescribed by the AML/CTF Rules' clause, but no such rules have been issued to date. This does not mean, however, that AUSTRAC has absolutely no regulatory oversight, because whenever digital currencies are exchanged for fiat currencies the transactions will generally intersect with banking or remittance services which are regulated under the AML/CTF regime.[102] AUSTRAC current position is that while digital currency may pose a greater risk in the future, "right now we are not seeing that there is the sort of risk that has us saying to government, "It is imperative that you give us greater sight over this'"".[103]

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[98] Parliamentary Joint Committee on Law Enforcement, Inquiry into financial related crime. Available online: http://www.aph.gov.au/Parliamentary_Business/Committees/Joint/Law_Enforcement/Financial_related_crime/Report.

[99] Parliamentary Joint Committee on Law Enforcement, 'Inquiry into Financial Crime', http://www.aph.gov.au/Parliamentary_Business/Committees/Joint/Law_Enforcement/Financial_related_crime; see for example AUSTRAC, *Submission 10*, pp. 20–21.

[100] ACC, Submission 5, Attachment 1, p. 17.

[101] ACC, Submission 5, Attachment 1, p. 18.

[102] Attorney-General's Department, *Submission 42*, p. 11.

[103] Ms Jane Atkins, Australian Transaction Reports and Analysis Centre, *Committee Hansard*, 7 April 2015, p. 52.

Self-regulation: Australian Digital Currency Commerce Association (ADCCA)

The digital currency industry is not objecting to regulation. In fact, as the Treasury notes "the industry, domestically, is trying to do self-regulation that in some respects mirrors some of the actual legal requirements, because they see that there is benefit in having a self-regulatory model."[104] In order to help manage relationships with banking services and be prepared for future regulation, some digital currency businesses have tried to mirror the obligations that are required by designated services under the AML/CTF regime, such as implementing know your customer programs.

The Australian Digital Currency Commerce Association (ADCCA) is the country's leading council and representation of and for digital currency businesses:

> The organisation's founding mandate is intended to act as the essential connection between merchants, industry, governments, regulators, financial institutions and influential policy forums which give direction to this emerging industry at home and abroad.

ADCCA recommended a self-regulatory model for the digital currency businesses:

> ADCCA believes a self-regulatory model enforced through its industry Code of Conduct, to which ADCCA members must adhere, is the ideal regulatory environment to support the Digital Currency industry. This framework will enable customers to have greater confidence in the entities providing Digital Currency FinTech services. The Code of Conduct comprises several best practice requirements benchmarked against requirements for Australian financial services institutions.[105]

According to ADCCA:

> In Australia the vast majority of Digital Currency businesses and users are law-abiding and desire the enhanced legitimacy of appropriate legal oversight and recognition. Incorporating Digital Currency into law enforcement legislation, particularly through the Anti-Money Laundering and Counter-Terrorism Financing Act 2006, is a necessary step toward guaranteeing the security and legitimacy of Digital Currencies in Australia.[106]

Efforts at self-regulation are hampered by the fact that the AML/CTF Act currently does not fully cover digital currencies. As a consequence of this, digital currency businesses are not able to access the Document Verification Service, which would better facilitate identity checking to meet AML/CTF requirements. It would seem reasonable to applying AML/CTF regulations to digital currency exchanges. In the very least this would assist bodies like ADCCA in their self-regulatory efforts.

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[104] Mr McAuliffe, Treasury, *Committee Hansard*, 4 March 2015, p. 23.
[105] Australian Digital Currency Commerce Association, *Submission 15*, p. 3.
[106] Australian Digital Currency Commerce Association, *Submission 15*, p. 14.

3. Recommendations

Bitcoin, a cryptocurrency, and the underlying technology upon which it is based—blockchain, or distributed ledger technology—is a new general purpose technology, and like other GPTs (such as lasers or personal computers) will have substantial and deep impact over many industries and over many years and decades to come. Its application to digital money and internet-based payments is just one of what is likely to be hundreds of domains of subsequent application. The fundamental risk that regulators face at this early juncture is that in the effort to control the technology *as it exists now*, they inadvertently lock-in or bias particular use-cases or product categories and foreclose future development and opportunities. The costs of early regulation accrue to stifled and truncated future technological development and the lost productivity gains that might bring. This suggests that the value of a wait-and-see attitude focused around regulatory learning will likely maximize the societal and economic gains through rapid exploration, experimentation and adoption of the new technology.

We recommend the following:

1. Regulate products and services as they develop, not the technology. That is, regulate particular applications and services based on cryptocurrencies, not cryptocurrencies themselves.
    - Wait for products to emerge then regulate case-by-case or 'business as usual'. This should be done through specialist extant regulators in these product categories (e.g. ASIC).
    - Adopt a 'permissionless innovation' approach (Thierer 2014), otherwise known in Australia as 'wait and see' regulation. As indicated in section 3 above, the Productivity Commission and ASIC have already signalled they intend to take this path.
    - Engage in regulatory learning through local experimentation, such as the use of a regulatory sandbox approach.
2. Allow self-regulation (e.g. through the Australian Digital Currency Commerce Association, ADCCA) and graduated regulation to develop
    - This allows local knowledge and experience to accumulate, indicating where regulatory agencies do and do not need to act.
3. Adopt a functional regulatory approach
    - Distributed ledger technology and cryptocurrencies are a general purpose technology and have multiple uses besides payments, many of which are still undiscovered. Specialist regulators should focus only on the products and services as they emerge and can be identified into functional product categories.

4. Conclusion

A particular conclusion we draw from this report is that the Reserve Bank of Australia should not be involved in regulation of cryptocurrencies in Australia.

In a previous ATA/IAEP report 'Who Should Regulate the Bank Interchange Fee?' it was argued that the RBA should not regulate the bank interchange fee, but that it should be done by a specialist regulator, such as the ACCC, on grounds of transparency and specialist competence. A similar argument applies here. Cryptocurrencies and distributed ledger technologies are a general purpose technology and should only be regulated at the point of particular applications and uses, which then falls to specialist regulatory domains.

Payments is a fast moving technological space, and the burgeoning development of cryptocurrencies, such as bitcoin, does much more than just introduce electronic money into an existing payments system. Because blockchain platforms such as Ethereum can be used to embed smart contracts (among other features, such as multisig transactions and decentralised autonomous organisations) into the payments ecosystem, the governance and regulation of payments platforms becomes inseparable from the underlying code or technology. Code is law, as Laurence Lessig put it. The regulatory role cannot stand outside the design and implementation of the technology, thus requiring specialised competence. As a specialist in monetary policy, the RBA does not have, nor should it have, these technical capabilities in code development or platform design. The Payments System Board was never well-placed within the Reserve Bank of Australia because of the very different specialisations.

These exciting developments in cryptocurrency as a new technology for payments furnish yet another reason why the *Payment Systems (Regulation) Act 1998* should be repealed, and Payment Systems regulation moved to a specialist regulator.

Attachment 4

WHAT DOES THE BLOCKCHAIN MEAN FOR GOVERNMENT?

- CRYPTOCURRENCIES IN THE AUSTRALIAN PAYMENTS SYSTEM -

WHAT DOES THE BLOCKCHAIN MEAN FOR GOVERNMENT? CRYPTOCURRENCIES IN THE AUSTRALIAN PAYMENTS SYSTEM

Chris Berg, Sinclair Davidson and Jason Potts

EXECUTIVE SUMMARY

- This paper introduces the radical opportunities that the invention of distributed ledger technologies offer for government, using the Australian payments system as a case study.
- Blockchains were invented as the underlying technology behind the Bitcoin cryptocurrency in 2009.
- With the blockchain the pseudonymous inventor 'Satoshi Nakamoto' solved the 'double spending' problem endemic to digital currencies and created a fully distributed ledger.
- The paper presents a guide to some of the major cryptocurrencies released since 2009.
- However, blockchains have more uses than just as cryptocurrencies. Blockchains are an 'institutional technology' which allow for the creation of new methods of exchange.
- The paper presents a model for the reform of government in light of the blockchain based on the new comparative institutional economics literature.
- In response to invention of the blockchain, governments should:
  - Allow firms to experiment and introduce blockchain enabled services – that is, take "permissionless innovation" approach.
  - Adapt regulatory environments to accommodate the use of blockchain applications where those applications cross over existing regulatory requirements – for example, in the space of taxation, and financial and prudential reporting.
  - Directly adopt blockchain technologies for delivering government services and to enhance (or replace) existing government processes.
- The paper presents as a case study the use of blockchain for the Australian payments system
- It provides a brief history of the development of the payments system since the colonial period
- Blockchains bring the payments system closer to the monetary system envisaged by Friedrich Hayek, where money and payments systems were structured by the market, rather than political demands
- The paper explores the implications of payments systems as two-sided market.
- Interchange fees exists to rebalance financial relationships within a two-sided market
- The paper explores how blockchains could be used more deeply in the financial system, suggesting the possibility of a 'cryptobank'
- The nature of blockchain technologies means that their adoption presents significant governance challenges for the Australian government
- The paper recommends that the Australian government adopt the organisational approach of the United Kingdom, which has a payments system regulator institutional separate from the central bank.
- Realising the huge opportunity of the blockchain will require forward-thinking and often dramatic reform.

1. INTRODUCTION

Blockchains and the cryptocurrencies they support offer potentially revolutionary opportunities for the Australian economy. In coming years, it is likely that we will see blockchain and distributed ledger technologies introduced into some of our most important economic and legal institutions, from the financial system, to identity management, to the organisation of private property rights.

The benefits from these blockchain applications could be immense. Blockchains can reduce and even eliminate some of the most fundamental barriers to efficient markets. They can drive deeper and more liquid markets, reduce the costs of finding and building economic relationships, and can return economic control to individuals away from hierarchical firms and states.

For policymakers, blockchains present a particular form of the 'innovation problem'. Most innovation policy questions focus on where the ideas for new innovations come from, how that development can be funded, and how innovations can be commercialized. There is a large amount of work globally on blockchain applications, and no obvious need for government intervention in their development. Australia is already participating in that work and has a number of promising blockchain firms.

However, the most potentially revolutionary and beneficial blockchain applications cross over, and often contradict, much of the existing regulatory and economic system. The significance of this is that the countries which best take advantage of blockchain opportunities will not necessarily be the ones that develop the technologies themselves. Rather, the countries which are able to adapt and reform their institutional frameworks will be best placed to take advantage of the blockchain revolution.

Taking advantage of the blockchain revolution means having regulatory environments that are able to accommodate blockchain applications. It means being willing to experiment with and adopt blockchains for the delivery of public services. It means having a taxation system that is adapted to the needs of blockchain-enabled firms and smart contracting arrangements.[1] In summary, to take exploit this opportunity, governments need to:

- Allow firms to experiment and introduce blockchain enabled services – that is, take "permissionless innovation" approach.[2]
- Adapt regulatory environments to accommodate the use of blockchain applications where those applications cross over existing regulatory requirements – for example, in the space of taxation, and financial and prudential reporting.
- Directly adopt blockchain technologies for delivering government services and to enhance (or replace) existing government processes.

[1] We raise some issues in this area here http://chrisberg.org/2017/10/opening-statement-to-house-standing-committee-on-tax-and-revenue-inquiry-into-taxpayer-engagement-with-the-taxation-system/

[2] A.D. Thierer, *Permissionless Innovation: The Continuing Case for Comprehensive Technological Freedom* (Mercatus Center, George Mason University, 2014).

This paper addresses the latter two points, by looking at one relatively simple blockchain use-case: the introduction of cryptocurrencies into the Australian payments system. Cryptocurrencies were the first application developed on the blockchain and are currently in the most advanced state of development. Introducing cryptocurrencies into the payment system offers a wide array of potential benefits, including faster and more reliable transaction processing, automatic auditing (that is, verifiability), and transaction permanence. However, integrating cryptocurrencies into the regulatory framework that governs payments is a non-trivial problem. The existing institutions have been developed and structured around specific technologies that have distinct economic properties and limitations. Blockchains materially change the economics of payments systems, and, if Australia is to realize the benefits of cryptocurrencies, will require significant regulatory reform.

This paper proceeds as follows. In Part 2 we provide a brief introduction to blockchain technologies. In Part 3 we explore the blockchain as an institutional technology and introduce the field of 'institutional cryptoeconomics'. In Part 4 we outline some economic principles that will underpin the introduction of the blockchain into political, legal and regulatory systems. In Part 5 we look at how blockchains can be used in the Australian payment system, beginning with a history of the payments system, and how the introduction of cryptocurrencies will have broad consequences for regulation and the monetary system. In Part 6 we offer a speculative proposal for a 'cryptobank' that follows from the prior analysis. Part 7 discusses the institutional framework that should govern these changes. Part 8 concludes.

2. A BRIEF INTRODUCTION TO THE BLOCKCHAIN

The blockchain is the underlying technology that powers the cryptocurrency Bitcoin and other cryptocurrencies. It was first outlined in 2008 by the pseudonymous 'Satoshi Nakamoto' in his white paper "Bitcoin: A Peer-to-Peer Electronic Cash system".[3] The blockchain is a decentralised, distributed ledger that records transactions without the need for a trusted third party or intermediary. Nakamoto's purpose was to develop a native digital currency that was not vulnerable to centralised authorities. In this sense he was contributing to a project that was already two decades old, and had been contributed to by DigiCash (founded in 1990), E-Gold (founded in 1996), and PayPal (founded in 1998).

Digital currencies are vulnerable to the 'double spending' problem. This problem derives from the fact that it is trivially easy to copy a digital item. Opportunistic users might try to buy two goods with one unit of currency. The double spending problem is similar to the counterfeiting problem with fiat currency. Typically this problem has been solved with a trusted intermediary that validates transactions to ensure they are not double spent. Bitcoin decentralised that validation, creating an open network governed by a protocol in which 'miners' compete to solve a difficult puzzle to validate the most recent transactions on the network.

The technologies which make up the blockchain were not especially new when they were brought together by Nakamoto. The blockchain uses **asymmetric cryptography**. Where symmetric cryptography uses the same key to both encrypt information and decrypt it, asymmetric cryptography has separate keys for encryption (a public key) and decryption (a

[3] Satoshi Nakamoto, "Bitcoin: A Peer-to-Peer Electronic Cash System," (www.bitcoin.org2008).

private key). This system of cryptography allows strangers to deposit information with a user but prevents strangers from withdrawing that information. Blockchains are distributed **peer-to-peer networks**. Networks can be either client-server or distributed. Client-server networks are easy to administer, secure and police but rely on a trusted client to update the network, and consequently present a single point of vulnerability. By contrast, peer-to-peer networks are decentralized, robust, hard to police and censor, but also hard to administer and ensure consistency (consensus) about the state of the network. Blockchains also utilize an **append-only database**, where information is immutable, and transactions are recorded as additional data rather than overwriting existing data (as, for instance, a simple Excel spreadsheet does). Each block in the blockchain includes a 'hash' (a secure cryptographic summary) of the previous block in a chain all the way back to the genesis block mined by Nakamoto himself.

Finally, the blockchain uses **game theory** in order to distribute consensus about the state of the network. In the Bitcoin blockchain, miners solve a difficult cryptographic puzzle for the right to update create a new block on the chain containing recent transactions. Successful miners are awarded with an amount of Bitcoin (currently 12.5 Bitcoin) for each correctly solved block. The difficulty of the puzzle updates periodically and the reward decreases periodically in order to maintain a steady rate of inflation. Mining is a costly signal that seeks to make the blockchain incentive compatible; that is, align users incentives to maintain and protect valid data and reject invalid data (such as double spending). The resulting network bakes economic incentives into the structure of the network itself, distributing economic value to those who maintain it.

Bitcoin was the first implementation of the blockchain but blockchains have been used for a wider range of applications. Bitcoin provides a public ledger which raises privacy issues, leading to the development of privacy-focused cryptocurrencies like ZCash and Monero. Developers quickly realized that other information – that is, records of ownership other than 'money' – could be carried on the blockchain. In 2011 Namecoin was established: a cryptocurrency that resolves domain names. Bitcoin includes a scripting language allowing users to develop contingent contracts – such as escrow services and multisignature transactions – into the network itself.

Blockchain technologies are in a rapid state of development. For example, Bitcoin (in its current form) does not scale well, transactions can be slow to reconcile, its verification algorithm is vulnerable to centralization, is extremely energy intensive, its scripting language is limited, and has governance problems surrounding technical updates. Each of these problems are being tackled by developers and entrepreneurs. Ethereum, launched in 2015, is a blockchain implementation that offers a more complex ('turing complete') scripting language, and is developing a 'proof of stake' consensus mechanism that seeks to resolve the high cost and potential centralization of Bitcoin mining. Other blockchains and adaptations of the original Bitcoin protocol provide solutions to these problems.

In 2017, the range of blockchain use cases has blossomed. Utilizing the enhanced scripting of Ethereum, more complex 'smart contracts' ensure that financial and other transactions are completed exactly as they have been written, without the need for human intervention or the possibility of censorship. A 'decentralised autonomous organisation' could utilize smart

contracts and pays in cryptocurrency in order to solve economic problems, such as managing a fleet of self-driving cars or an insurance network. Private and permissioned blockchains enable organisations to implement their own blockchains in a trusted or semi-trusted environment. In the next section we describe some of the main cryptocurrencies as a guide to the blockchain ecosystem.

A guide to significant cryptocurrencies

Bitcoin

Bitcoin is the original cryptocurrency. Invented by the pseudonymous Satoshi Nakamoto, Bitcoin was released as open-source software in 2009. Bitcoin is limited to 21 million bitcoins, a limit which is expected to be reached around 2140. Nakamoto stepped back from development in 2010. The software which manages the Bitcoin network is managed by a team of volunteer developers. The miners, who validate transactions in return for the right to forge new Bitcoins, also exercise influence over changes to the network.

Namecoin

Namecoin was the first 'fork' of the Bitcoin network, which occurred in 2011. Namecoin's key usecase is as a censorship proof domain system. In the current internet, domain registration and resolution is provided by the Internet Corporation for Assigned Names and Numbers (ICANN), a centralised non-profit multistakeholder authority. Namecoin runs .bit, a distributed rather than centralised top level domain. Namecoin has broader uses for identity management.

Litecoin

Litecoin was established in 2011 as a fork of Bitcoin designed to resolve some of the technical issues in Bitcoin. Litecoin speeds up the creation of new blocks, aiming at a target of a new block every 2.5 minutes rather than every 10 minutes. Litecoin also has a different hashing algorithm and a larger limit on total coins (84 million).

Ripple

Ripple is a real-time currency exchange settlement initialed released in 2012. Ripple does not use a public blockchain. Rather, it is secured by a private blockchain connected a set of verified nodes (such as participating financial institutions). Ripple's coins, XRP, are not mined but are issued. Ripple is being experimented with and used by a large number of major financial institutions to speed up interbank payments.

Dash

Dash was originally released as XCoin in 2014. Dash is a fork of Litecoin, which divides its governance and verification into two tiers. Blocks are created by miners. Governance functions are provided by masternodes, that operate Dash as a decentralised autonomous organisation. Dash also has privacy features utilizing a coin-mixing tool (PrivateSend) and features near instant transactions (InstantSend).

Ethereum

Ethereum was developed by Vitalik Buterin and went live in July 2015. Ethereum is a cryptocurrency with a large number of distinct features from Bitcoin. Its primary feature is that it offers a 'turing complete' scripting engine which allows for complex computation. Ethereum acts as a universal global computer. Ethereum's currency is called Ether and computations on the network require 'gas' to pay for and ration scarce computational resources.

Monero

Monero was released in 2014 as a privacy focused cryptocurrency. Monero hides the sender, recipient and volume of a transaction by mixing addresses for recipients,, generating 'stealth' addresses for senders, and hiding transaction volumes.

Zcash

Zcash was released in 2016 as a privacy focused cryptocurrency that both utilizes a public blockchain and allows users to conduct private transactions that conceal the sender, recipient, and volume of a transaction. Zcash utilizes zero-knowledge succinct non-interactive arguments of knowledge (zk-SNARKs), a type of cryptography that allows provers to demonstrate to verifiers that a statement is true without providing any information beyond the verification.

Augur

Augur is a decentralised prediction market built on top of the Ethereum network. Released in 2016, Augur has its own native cryptocurrency (reputation or REP). REP is used to resolve predictions and successful predications are paid out in Bitcoin or Ethereum.

3. THE BLOCKCHAIN AS AN INSTITUTIONAL TECHNOLOGY

Beyond the internet payments envisioned by Nakamoto and early digital currency proponents, some early and obvious financial use cases of blockchains include trade finance, the facilitation of international payments, banking and financial settlement, the creation and maintenance of new financial instruments. Other uses include permanently recording property ownership on the blockchain, such as property titles, caveats, and encumbrances, and for supply chain management, such as offering a permanent and indelible record of provenance. Further down the track but potentially revolutionary is digital identity management on the blockchain which, when combined with privacy enhancing features, could significantly change the relationship between the government and citizen data.[4]

Institutional cryptoeconomics is an economic approach to understand the economic consequences of the adoption of blockchain technologies for governments, firms and society

[4] See Chris Berg, "Medicare Details Available on Dark Web Is Just Tip of Data Breach Iceberg," *Canberra Times*, 17 July 2017.

more generally. Institutional cryptoeconomics provides a framework to identify potential uses of blockchains and how the institutions of society might shift and adapt in response.

The study of blockchain technologies is in a very early stage but we can distinguish two schools of thought. The first conceptualises blockchain as a new *general purpose technology*.[5] General purpose technologies are innovations which are characterised by their broad potential use-cases ('pervasiveness'), their capacity for technological improvement and their complementarity with other technologies. In this, blockchain joins the ranks of steam power, electricity, and the semi-conductor. Blockchains reduce the costs of verifying identifies and networking without intermediaries, opening up the possibility of new markets and to significantly reduce transaction costs in existing markets.[6]

By contrast, institutional cryptoeconomics sees blockchain as an *institutional technology*. Rather than enhancing existing economic institutions, blockchains opens up new opportunities for exchange – that is, to create new *economies*.[7] Blockchain is a distributed computation technology for coordinating activity in a distributed economy. Institutional cryptoeconomics is in the transaction school tradition of Nobel laureates Ronald Coase and Oliver Williamson and sees the blockchain as a new type of economic institution that enhances (and competes with) the existing economic institutions of capitalism: firms, markets, commons, relational contracting, and governments.

A decentralised distributed ledger is significant because ledgers have a previously unheralded critical role in economic organisation. Ledgers consist of data structured by rules. A ledger records (that is, maintains consensus about) ownership and provides a mechanism to verify that ownership. As Davidson, Potts and De Fillipi write,

> A ledger is an ancient accounting technology to record (i.e. maintain consensus about) whom (or what) owns what, of who (or what) has agreed to what, of what counts as a what, and to record when anything of value is transacted. As the fundamental instruments of transactional legitimation, ledgers are an elemental technology of modern market capitalism and statecraft (Nussbaum 1933, Yamey 1949, Allen 2011). So a significant shift in ledger technology—from a centralised method of producing consensus in the ledger (using trust) to a distributed approach to consensus (using the blockchain)—could transform the transactional mechanics of a modern economy.[8]

This approach places ledgers at the center of any structure of property ownership. Any system of property rights needs a ledger to record ownership and for owners and others to consult.

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[5] Timothy F Bresnahan and Manuel Trajtenberg, "General Purpose Technologies: 'Engines of Growth'?," *Journal of econometrics* 65, no. 1 (1995); Trent J MacDonald, Darcy WE Allen, and Jason Potts, "Blockchains and the Boundaries of Self-Organized Economies: Predictions for the Future of Banking," in *Banking Beyond Banks and Money* (Springer, 2016).

[6] Christian Catalini and Joshua S Gans, "Some Simple Economics of the Blockchain," (National Bureau of Economic Research, 2016); Marc Pilkington, "Blockchain Technology: Principles and Applications," in *Research Handbook on Digital Transformations*, ed. F Olleros and M Zhegu (Cheltenham: Edward Elgar, 2015); David Yermack, "Corporate Governance and Blockchains," *Review of Finance* 21, no. 1 (2017).

[7] Sinclair Davidson, Primavera de Filippi, and Jason Potts, "Blockchains and the Economic Institutions of Capitalism," *Journal of Institutional Economics* (forthcoming); Chris Berg, "What Diplomacy in the Ancient near East Can Tell Us About the Blockchain," *SSRN* (2017).

[8] Davidson, Filippi, and Potts.

Institutional cryptoeconomics says it is not enough to assert the existence of a property rights regime. Property rights require institutional technologies (firms, markets, governments, etc.) to maintain ledgers of ownership. Owners need their ownership to be recorded on the ledger to draw on the rights associated with that property. Buyers need to know what they are buying can be legitimately sold.[9]

As this suggests, the most basic property right is a property and land title register. But much of what government does is maintain ledgers of property rights. The register of Births, Deaths and Marriages records the existence of individuals at key moments in their life. Business registers record information about taxable corporate forms. Citizenship is a ledger, recording who enjoys the privileges and responsibilities of citizenship – voting, taxation, and jury duty - and who (through their absence on the ledger) is excluded from their privileges and responsibilities. Ledgers record who can sit in parliament, who can work with children, who has security clearance. Social security rights are a ledger, recording who (and under what circumstances) has a right to an entitlement – subsidized health care, subsidized education, disability and old-age pension support.

Much regulation and regulatory technology is structured around ledgers. Ledgers structure tax obligations. Ledgers record who can practice medicine, who can serve liquor, and which firms can mine and where. Ledgers record who can offer banking services (authorized deposit institutions) and which firms (and accounts) have their deposits protected by law. Governments audit firms (or license private auditors) to ensure they are solvent. The monetary system is a ledger. Since the end of the free banking system in Australia, the government has assumed the role of the maintenance and validation of the ledger of money ownership. While the ownership of physical currency is indicated by its possession, the existence of a note is recorded, released, authorised and validated by the Reserve Bank of Australia.

The ideal ledger has ten properties: completeness (all relevant economic elements of the real world are mapped on the ledger), correspondence (its data corresponds to the real world), compactness (it is a minimum efficient representation of the real world), predictability (it changes only when the real world changes), robustness (it is resistant to changes that are not reflected in the real world), integrity (the ledger only contains 'good' information), legibility (the ledger needs to be readable), accessibility (the ledger can be accessed a low cost), and updatability (the ledger is immutable – it cannot be rewritten, only added to). Finally, and most fundamentally the ideal ledger represents a social consensus about the state of the world.

Each of these ledgers described above operated (or supervised) by the hierarchical institution of the state. Government variously plays the role of trusted authority with the responsibility of maintaining the ledger, authorizing transactions on (that is, changes to) the ledger, and verifying ledger entries. Government plays these roles because it was both practically and technically necessary for it to do so. The government, with a monopoly of the use of force and funded by compulsory taxation, is in the best position to manage ledgers that approximate the attributes of an ideal ledger.

[9] Chris Berg, Sinclair Davidson, and Jason Potts, "The Blockchain Economy: A Beginner's Guide to Institutional Cryptoeconomics," *Medium* 2017.

The invention of the blockchain significantly changes this technical and economic calculus. On a number of characteristics blockchains can more closely approximate the ideal ledger than government run ledgers. The censorship-resistance of the blockchain makes has superior robustness and integrity properties. The distributed nature of the blockchain is more accessible than government ledgers: the blockchain is 'always-on' (by comparison with a government ledger which can often only be accessed during, for instance, business hours) and accessible to users who simply have internet access. The blockchain is immutable – and verifiably so – unlike many government databases. For the purposes of both verification and updating the blockchain is decentralised and (for public blockchains at least) accessible to all.

At the first approximation this means that many ledgers maintained and operated by the government can now be more effectively and efficiently operated by the blockchain in a decentralised fashion. In the next section we outline some principles to understand how introducing the blockchain to government policy and process represents a fundamental institutional change.

4. REFORM OF GOVERNMENT AND THE STATE IN LIGHT OF THE BLOCKCHAIN

The blockchain is just as likely to disrupt government as it will disrupt industry and the private sector. Government, however, is a very loose term that describes the public, and usually not-for-profit, sector of the economy. There is much more to government than the traditionally understood executive, legislature, and judiciary. At this very high level of abstraction the blockchain is likely to disrupt a lot of the activities currently perform by the judiciary. In order to gain a better understanding of disruption it is worthwhile examining some of the functions of the state (rather than a narrow examination of government).

Adam Smith prescribes three governmental functions: national defence, the administration of justice, and public works "which though they may be in the highest degree advantageous to a great society, [they] are, however, of such a nature, that the profit could never repay the expense to any individual or small number of individuals".[10] Smith, however, provides a strong caveat to his public goods argument; these public works exist chiefly to "facilitate the commerce of society" and "instruction of the people". Herbert Spencer had a more limited role for government; "to defend the natural rights of man – to protect person and property – to prevent the aggressions of the powerful upon the weak – in a word, to administer justice".[11] Ludwig von Mises provides a similar perspective.[12]

> As the liberal sees it, the task of the state consists solely and exclusively in guaranteeing the protection of life, health, liberty, and private property against violent attacks. Everything that goes beyond this is an evil. A government that, instead of fulfilling its task, sought to

[10] Adam Smith, *An Inquiry into the Nature and Causes of the Wealth of Nations* (Chicago: University of Chicago Press, 1976), vol 2, p. 244.
[11] Herbert Spencer, "The Proper Sphere of Government," in *The Man Versus the State: With Six Essays on Government, Society, and Freedom* (Indianapolis: Liberty Fund, 1982), 187.
[12] Ludwig von Mises, *Liberalism: The Classical Tradition* (Indianapolis: Liberty Fund, 2005), 30.

> go so far as actually to infringe on personal security of life and health, freedom, and property would, of course, be altogether bad.

A minimal state that exists simply to deter violence and administer justice will not suffer too much disruption – apart from fewer contractual dispute entering the courts. The modern state, however, does much more than simply deter violence. According to Friedrich Hayek, there are at least (additional) four areas when government action occurs.[13]

- First, where the market would not provide any service, for example, "a reliable and efficient monetary system", "setting of standards of weights and measures", "land registration, statistics, etc". Hayek includes here "the support, if not also the organization, of some kind of education".
- Second, those services that are clearly desirable, including "most sanitary and health services, often the construction and maintenance of roads, and many of the amenities provided by municipalities".
- Third, other activities such as to "encourage the advancement of knowledge".
- Fourth general regulation is a legitimate function of government.

Tellingly Hayek describes the first of these four activities as facilitating "the acquisition of reliable knowledge about facts of general significance". In other words being either an information broker or a trusted third party. It is here that the activities of the government and state will be directly disrupted. Any organisation be it public or private that simply acts as an information broker or trusted third party is very likely going to be disrupted by the blockchain. Importantly to the extent that the government earns revenue from those roles that revenue is also likely to be disrupted. Hayek's idea that the private sector cannot or will not provide a reliable and efficient monetary system is discussed below. It is also very likely that many – but not all – of the regulatory functions of the state will be disrupted.

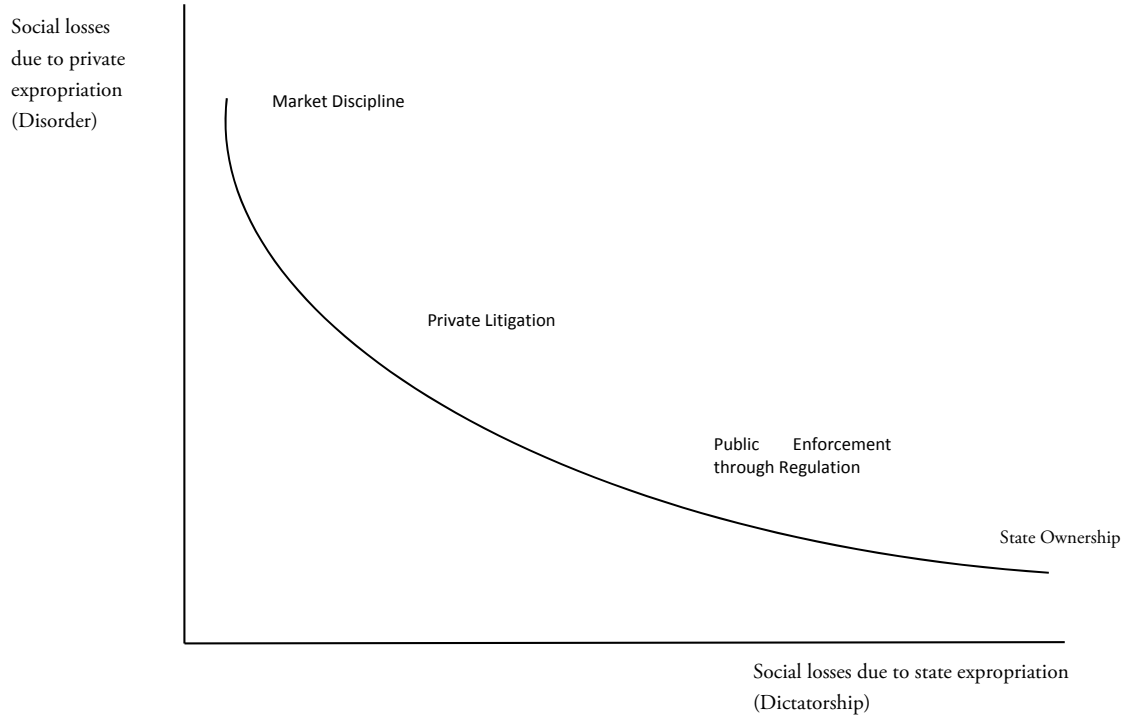
When it comes to government intervention and regulation James Buchanan has argued that society stands between anarchy and leviathan.[14] A regulatory model that incorporates this insight has been proposed by Andrei Shleifer (and co-authors) who developed an institutional regulatory theory that posits regulation as emerging from societal trade-offs between the *costs of private disorder* (anarchy) and the *costs of government dictatorship* (leviathan).[15] Disorder relates to the ability of private individuals to inflict harm on others, while dictatorship relates to the ability of government and its bureaucrats to inflict harm on citizens.

Shleifer then investigates examines four broad governance strategies that 'society' can pursue in order to achieve some objective relative to the trade-offs associated with those strategies. These strategies are; 'market discipline', 'private litigation', 'public enforcement through regulation', and 'state ownership'. The relationship between the trade-off between disorder

[13] Friedrich Hayek, *The Constitution of Liberty: The Definitive Edition* (Taylor & Francis, 2013), 332-34.
[14] James Buchanan, *The Limits of Liberty: Between Anarchy and Leviathan* (Indianapolis: Liberty Fund, 2000).
[15] Andrei Shleifer, *The Failure of Judges and the Rise of Regulators*, Walras-Pareto Lectures (Cambridge, Mass.: MIT Press, 2012)..

costs and dictatorship costs and these four strategies is traced out in figure showing the so-called institutional possibilities frontier.

Figure 1. Institutional Possibilities Frontier



In this framework, market discipline should be considered as the regulatory default. Of course, that is not always possible and at this point the control strategy becomes private litigation. The state begins to play a role as the rules of contract and tort law are administered by courts of law staffed by bureaucrats and judges. Courts of law exist, at this level, to enforce private agreements and to adjudicate disputes between private parties.

Chicago school economists have argued that the combination of market discipline and courts of law should suffice for any regulatory framework. Shleifer, however, has argued that courts cannot always resolve disputes cheaply, predictably, or impartially. This is especially the case when the parties to the dispute have vastly different resources that they can deploy to a legal dispute.

Regulation occurs when the state not only provides a dispute resolution mechanism but also writes the rules that govern economic behaviour and transactions. There is substantial variation in how government can enforce its regulations. It can, for example, allow bureaucrats to engage in a regime of inspection and verification with fines being issued for non-compliance. Alternatively, the state can provide a set of rules that are privately litigated, or publicly litigated. Public litigation can consist of either civil or criminal charges. Similarly the regulatory agency can initiate litigation itself for breeches of the regulations, or act once a complaint has been received. This notion has been extensively debated in the context of financial regulation.

La Porta, Lopez-de-Silanes, and Shleifer investigate the impact of security laws on financial markets across 49 economies including Australia.[16] In particular they investigate how security laws operate to protect investors and whether regulators with public enforcement or rules with private enforcement lead to better outcomes. After exhaustive empirical analysis, they find that legal rules matter, but that regulators do not always matter. So long as rules can be enforced in courts investors do not need to be protected by regulators. Barth, Caprio and Levine (2006) find an analogous result in their investigation of bank regulation and supervision across 107 countries including Australia.[17] They summarise their results as raising a cautionary flag against regulatory practices that involve direct oversight and restrictions on banks. Barth et al. (2006) conclusions are remarkably similar to the La Porta et al. results. Regulations involving prescriptive behaviour and powerful regulators using public enforcement mechanisms are not the better techniques to employ for the purpose of social control.

The important point being that even before the advent of the blockchain that the role of regulators (as opposed to regulation) was being questioned.

Finally, state ownership appears to be an efficient response to those situations where the disorder costs are likely to be very high. Shleifer gives the examples of prisons, police force, and military where this is likely to be the case. The costs of disorder resulting from private ownership here are potentially so large that government needs to maintain control over these institutions. A group of scholars at RMIT University have applied this general model to several very specific instances, including the scope for regulatory reform leading to productivity improvements, environmental protection laws, the regulation of free speech, the institutions of innovation policy and entrepreneurship, prudential bank regulation, tobacco control, and education.[18] Berg and Allen extend the institutional possibility frontier to incorporate subjective perceptions of dictatorship and disorder costs.[19]

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[16] Rafael La Porta, Florencio Lopez-de-Silane, and Andrei Shleifer, "What Works in Security Laws?," *The Journal of Finance* 61 (2006).

[17] James R. Barth, Gerard Caprio, and Ross Levine, *Rethinking Bank Regulation : Till Angels Govern* (Cambridge England ; New York: Cambridge University Press, 2006).

[18] Sinclair Davidson, "Productivity Enhancing Regulatory Reform," in *Australia Adjusting: Optimising national prosperity* (2013). "Environmental Protest: An Economics of Regulation Approach," *Australian Environment Review* 29, no. 10 (2014). Chris Berg and Sinclair Davidson, "Section 18c, Human Rights, and Media Reform: An Institutional Analysis of the 2011-13 Australian Free Speech Debate," *Agenda: a Journal of Policy Analysis and Reform* 23, no. 1 (2016). Sinclair Davidson and Jason Potts, "Social Costs and the Institutions of Innovation Policy," (2015); "A New Institutional Approach to Innovation Policy," *Australian Economic Review* 49, no. 2 (2016); Chris Berg, "Safety and Soundness: An Economic History of Prudential Bank Regulation in Australia, 1893-2008" (RMIT University, 2016); Sinclair Davidson, "Some (Micro)Economics of Red Tape and Regulation," in *Australia's Red Tape Crisis*, ed. Darcy Allen and Chris Berg (Connor Court Publishing, forthcoming); Darcy WE Allen, "The Subjective Political Economy of Innovation Policy," (2016); Aaron Lane, "Institutions of Public Education," (SSRN2017).

[19] Darcy WE Allen and Chris Berg, "Subjective Political Economy," *New Perspectives on Political Economy* (Forthcoming).

Introducing the impact of blockchain into this regulatory framework requires an analysis of the source of disorder costs. The full definition of disorder is as follows:[20]

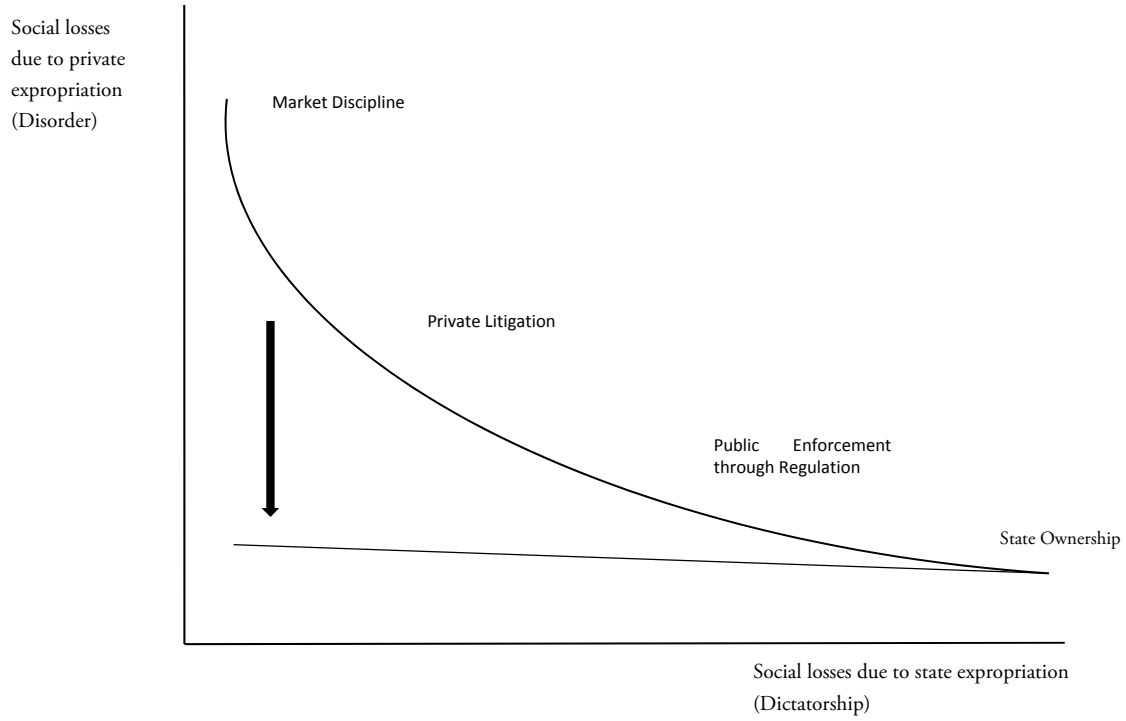
> Disorder refers to the risk to individuals and their property of private expropriation in such forms as banditry, murder, theft, violation of agreements, torts, or monopoly pricing. Disorder is also reflected in the private subversion of public institutions, such as courts, through bribes and threats, which allows private violators to escape penalties.

From that definition there are two sources of disorder: violence and opportunism. Violence is easy to understand and quite legitimately the state works to suppress violence. Opportunism requires some more explanation. Economists generally assume that individuals are self-interested. This seems to be an uncontroversial assumption – but in standard economic theory there are strict limits to self-interest. In standard theory individuals do not cheat, do not lie, and do not steal. It is well-known, however, even by economists that individuals do engage in dishonest practices, and these practices are usually discussed under the headings of adverse selection and moral hazard. Oliver Williamson, the 2009 economics laureate, has suggested the term opportunism to describe a strong-form of self-interest.[21] He argues that individuals engage in "self-interest seeking with guile", specifically "calculated efforts to mislead, distort, disguise, obfuscate, or otherwise confuse". In Williamson's scheme adverse selection and moral hazard are special cases of opportunism. In the presence of opportunism disorder costs are likely to be high as individuals cannot trust their trading partners. Consequently some transactions never occur or do occur at price discounts (the market for lemons) or resources need to be expended to either engage in monitoring or bonding. In such an environment auditing and surveillance by both private actors and the government (via regulatory agencies) becomes efficient. Efficient – but at great cost to society as resources are diverted from otherwise productive use to these activities.

The blockchain is often (incorrectly) described as being a "trustless" technology. Rather than being a trustless technology, the blockchain has design principles that incentivize good behaviour on the part of market participants and ensure that transactions are self-verifying. In other words, opportunism is severely constrained – if not actually eliminated from transactions. To the extent that opportunism is constrained, the disorder costs associated with transacting on the blockchain are much lower than otherwise. This in turn has a profound impact on the shape of the institutional possibilities frontier.

[20] Simeon Djankov et al., "The New Comparative Economics," *Journal of comparative economics* 31, no. 4 (2003).
[21] O.E. Williamson, *The Economic Institutions of Capitalism* (Free Press, 1985).

Figure 2: Institutional Possibilities Frontier with Constrained Opportunism



Social control to ensure good private behaviour is largely unnecessary. The design of the blockchain ensures cooperative behaviour amongst market participants and the scope for private litigation declines. So too the role of regulators is diminished. As those industries whose business models are based on information brokerage and the creation of trust are disrupted, so the regulators of industries will be disrupted too. This argument, however, does not mean that policing activities will necessarily be disrupted – to the extent that the blockchain is deployed for purposes that are illegal the need for criminal enforcement remains unchanged.

5. A CASE STUDY: REFORMING THE AUSTRALIAN PAYMENTS SYSTEM

The Australian financial system developed in the wake of the Victorian gold rush. Payments were made in private bank notes, coins, and by cheque. Even in the earliest periods of the Australian financial system currency and coins were only a small portion of the payments system – most payments were made by cheque. Prior to the establishment of a clearing house in Melbourne in 1867, cheques were settled manually, with bank clerks carting gold around the city between banks.[22] One of the minor consequences of the banking crisis of 1893 was the establishment of more formal cheque clearing houses the year later.

The framework of the Australian payments system was established as part of the takeover of Commonwealth control of the financial sector. Until 1911 the Australian financial system was a free banking system. Banks and bank-like firms were (relatively) unregulated, and Australia had no central bank with regulatory or monetary policy function. In the wake of the 1893 crisis

[22] C. B. Schedvin, *In Reserve : Central Banking in Australia, 1945-75* (St Leonards, NSW: Allen & Unwin, 1992).

there was a concerted political push for a central bank. The government took over note issue in 1910 (imposing a prohibitive tax on private notes). The Commonwealth Bank was established in 1911 as a competitor to the private banks. The Commonwealth Bank Act 1924 handed control of the note issue to the central bank, and simultaneously sought to nationalize exchange settlement by requiring banks to keep an exchange account for interbank settlement at the central bank. The Commonwealth Bank's status as a fully-fledged central bank (both with monetary and prudential regulatory purposes) was established after the 1936 Royal Commission into Money and Banking and the Banking Act 1945 which implemented the Royal Commission's recommendations.[23] In 1959 the Commonwealth Bank was divided between its commercial arm and its central banking functions, now called the Reserve Bank of Australia (RBA).

Banking deregulation and the introduction of foreign banks put significant pressure on the structures of the payments system. Non-bank financial institutions (NBFIs) chafed against the privileges held by banks in the financial sector. In 1993 the establishment of the Australian Payments Clearing Association gave foreign banks and NBFIs direct access to the payments system. Previous to this, the non-banks and foreign banks would need to have their cheques settled by the domestic major banks. Amendments to the *Reserve Bank Act* in 1998 in the wake of the Wallis inquiry gave the RBA a specific mandate for control and regulation of the payments system.

Today, the RBA both directly provides payments system services and regulates private sector payments services.[24] The RBA designates which payments systems are subject to regulation, determines the rules for access to those systems (including controlling which financial institutions and users can access those systems), sets technical and regulatory standards for the systems, and arbitrates disputes. The RBA oversees and sets standards for licensed clearing and settlement facilities. The continued responsibility for the note issue is one of the key direct services provided by the RBA. But RBA also hosts settlement exchange accounts for the final settlement of payments between banks, credit unions and building societies, and operates the Reserve Bank Information and Transfer System (RITS), a real time gross settlement service for high value settlements. The RITS was established in 1998 to reduce settlement risk between Australian banks.

The RBA's longstanding role in the payments system has a number of unappreciated downstream consequences. Historically, the prudential control of banking was justified (albeit not entirely) on the specific importance of the payments system and the reduction of settlement risk between financial institutions.

Banks have long been accorded special privileges within the Australian financial system. Section 51 (xiii) gave the Commonwealth responsibility for the banks (and state banking that extends beyond the limits of the state) and the 1909 *Huddart Parker* decision gave

[23] A history of prudential bank regulation in Australia is provided in Berg, "Safety and Soundness: An Economic History of Prudential Bank Regulation in Australia, 1893-2008."
[24] A useful overview of the Australian payment system and the RBA's role within it is Committee on Payments and Market Infrastructures, "Payment, Clearing and Settlement Systems in Australia," (Bank for International Settlements, 2011).

responsibility for NBFIs such as building societies to the states. This divided regulatory control between the Commonwealth-regulated banks and state-regulated NBFIs that gave each a distinct regulatory character. Entry to the banking sector was strictly controlled, and requests by foreign banks to enter the market knocked back, reducing competitive pressure in the sector. The *quid pro quo* provided was that banking products – particularly interest rates - were strictly regulated.

The landmark 1981 Committee of Inquiry into the Australian Financial System which set the stage for the subsequent reform of the financial system (known colloquially as the 'Campbell committee') identified competitive neutrality was one of the desirable attributes of an efficient financial system. Nevertheless, it maintained that banks had a 'special' place in the financial system, demanding higher levels of prudential regulation than NBFIs. It based this argument on three reasons: small depositors needed a safety haven for their funds, a banking collapse could have systemic consequences, and "Trust is a pre-condition for an efficient payments system: cheque-clearing institutions must be able to deal confidently with one another".[25]

The 1996 Wallis inquiry sought to make the financial system more competitively neutral in part by eliminating the distinctions between financial institutions. Banks, building societies and other NBFIs were compressed into a category 'authorised deposit institution' (ADI) which was categorized by providing deposit services that had a high 'intensity' of promise. A major goal of the Wallis inquiry was to try to remove implication that the government would support depositors in the wake of a banking failure.[26] One of the strategies by which it sought to achieve that was by removing any suggestion that banks were 'special' in a public policy sense. Yet this was only partial. Rules surrounding access to the payments system was still under Wallis pegged to the higher prudential standards that applied to banks. As Rayna Brown and Kevin Davis wrote, much competitive advantage conferred on banks would be lost under the ADI distinction but the perseverance of banks' unique regulatory position in the payments system would "do little to dispel the notion that banks are special".[27]

As this suggests, government regulatory control over the payments system is one of the key factors behind the continued 'specialness' of banks. Why does it matter if banks are special? As one of us has argued, the implied and explicit guarantee of Australian bank deposits is a reflection of the stubborn policy belief that banks are unique institutions in the financial system that require unique policy settings.[28] The development of the explicit deposit guarantee between 2001 and 2008 in Australia was facilitated by this continued belief; a belief that was justified in part because of the role banks had in the payments system.

The consequences of that relationship are significant. Deposit guarantees represent a transfer of wealth from taxpayers to depositors of failed banks. Guarantees reduce the effectiveness of market discipline on banks, distort incentives for bank management and can

[25] Committee of Inquiry into the Australian Financial System, *Final Report* (Canberra: A.G.P.S, 1981), 296.
[26] For a prehistory of the deposit guarantee in Australia, see Chris Berg, "The Curtin-Chifley Origins of the Australian Bank Deposit Guarantee," *Agenda: A Journal of Policy Analysis and Reform* 22, no. 1 (2015).
[27] Rayna Brown and Kevin Davis, "The Wallis Report: Functionality and the Nature of Banking," *Australian Economic Review* 30, no. 3 (1997).
[28] Berg, "Safety and Soundness: An Economic History of Prudential Bank Regulation in Australia, 1893-2008."

make a financial system less stable. Charles W. Calomiris and Stephen H. Haber have documented how political alliances between populist politicians and depositors can make a financial system significantly less stable.[29] As we have shown here, government regulation and control over the payments system is one (mostly unrecognized) mechanism by which that political relationship can manifest itself.

The Payments System Board determines the RBA's payment system policy. The Board is intended to be separate from the RBA's monetary policy approach by its existence as a board distinct from the Reserve Bank Board. However the RBA Governor sits on the top of each board with a mandate resolve inconsistencies. To the extent that decisions about payments system may contradict the RBA's monetary stance – as it is quite possible crypto currency decisions may do – the payments system is subordinate to monetary policy.

Bringing blockchain into the payments system

The monetary system very heavily relies on trust. Money is a social institution of trust that overcomes the double coincidence of wants that makes barter so inefficient. An instrument that can be traded for any other good or service and that has wide social acceptance as such increases the scope for mutually beneficial trade and enriches society. What is important to understanding money is the understanding of the role of trust. The individuals who receives money, however, defined must be confident that they can and will be able to exchange that money for goods and services of equal value to what they have just sold.

Money is very often defined in terms of its functions:

- Medium of exchange – money breaks the double coincidence of wants.
- Unit of account – money can be used to express prices.
- Store of value – money can be stored for future usage.

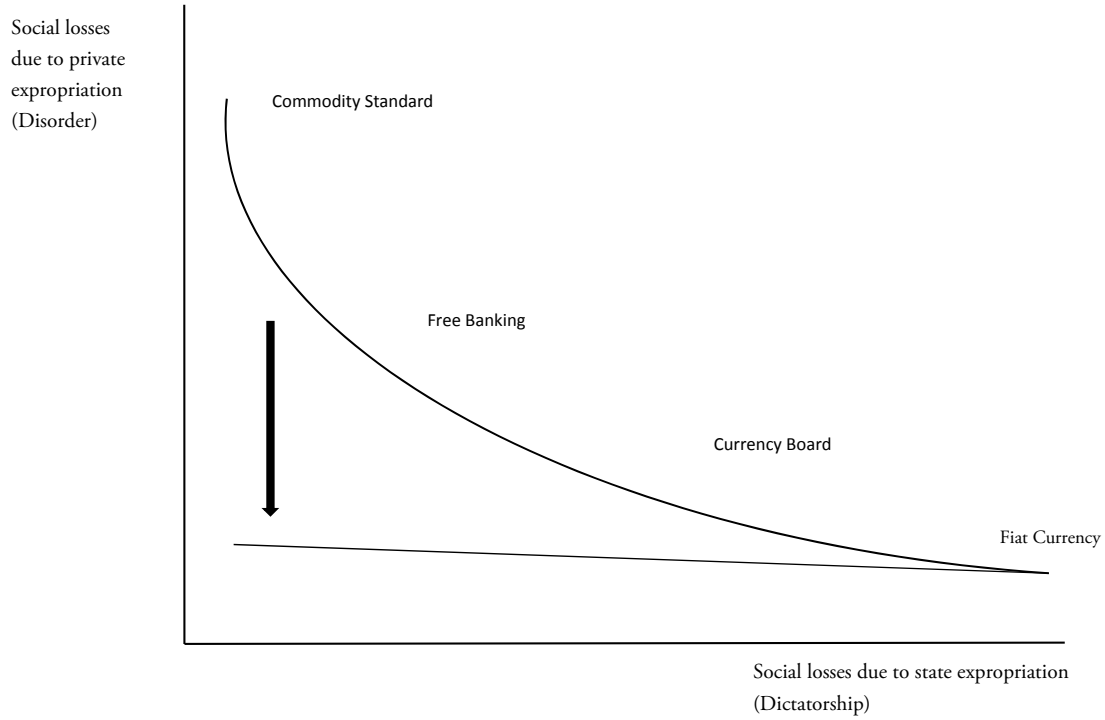
These functions, however, provide little guidance as what it is that can be used as money. Money can be plotted along an institutional possibilities frontier showing the relative disorder and dictatorship costs of the various instruments used as money (see figure 3). Disorder costs in this sense can be summarised as counterfeiting while dictatorship costs can be summarised as inflation. An obvious commodity standard would be the gold standard. In such a monetary system gold is used as money but is subject to large value fluctuations as gold supplies become relatively scare (i.e. no new sources of gold are discovered) or inflations (as new supplies of gold become available due to gold rushes or colonial acquisition). The social cost of using gold is that both individuals and governments have an incentive to debase the gold. In this instance individuals have to trust the circulating medium itself. The government has very little control over money itself.

In a free banking environment each bank is able to issue its own bank notes and individuals have to trust the institution issuing the notes to not inflate the currency. In this environment counterfeiting is the biggest problem facing the monetary system. A currency board exists where government set a fixed exchange rate between the domestic currency and a foreign

[29] Charles W. Calomiris and Stephen H. Haber, *Fragile by Design the Political Origins of Banking Crises and Scarce Credit*, The Princeton Economic History of the Western World (Princeton: Princeton University Press, 2014).

currency and simply exchange currency at that rate. Finally a fiat currency system exists where government declares money to be valuable *and* individuals accept that declaration. The biggest social costs associated with fiat currency is inflation.

Figure 3: The Monetary System on an Institutional Possibilities Frontier



Before we explain how the blockchain and cryptocurrencies can modify the institutional possibilities frontier we first discuss the dictatorship costs associated with the monetary and payments system.

It is important to clearly define what inflation is, and the assign blame for inflation. Hayek defines inflation as 'an excessive increase in the quantity of money which will normally lead to an increase in prices'.[30] Modern readers may have difficulty with this definition; inflation is now taken to mean a general and sustained increase in the level of prices. Prices increases, however, are a symptom of inflation as Milton Friedman makes clear, 'more rapid increase in the quantity of money than in the quantity of goods and services available for purchase will produce inflation, raising prices in terms of that money'.[31]

Hayek did propose, that for practical purposes, the monetary authority could aim to stabilise 'some comprehensive price level'.[32] That does appear to be the standard anti-inflation technique. Hayek, however, indicated that the index should not only contain consumer prices and that the index should be based on international prices and not just local consumer prices. Hayek was emphatic that there can be no such thing as 'cost-push' inflation. Inflation is a

[30] Friedrich Hayek, "Further Considerations on the Same Topic," in *New Studies in Philosophy, Politics, Economics and the History of Ideas* (London: Routledge, 1975), 217.
[31] Milton Friedman and Rose D. Friedman, *Free to Choose: A Personal Statement* (Pelican, 1980), 297.
[32] Hayek, *The Constitution of Liberty: The Definitive Edition*, 464.

monetary phenomenon; 'neither higher wages nor higher prices of oil, or perhaps of imports generally, can drive up the aggregate price of all goods *unless the purchasers are given more money to buy them*' (emphasis original).[33]

Hayek did believe that government was responsible for inflation and that it had become easy to inflate after the 'destruction of the gold standard'. He sympathised with people who regarded a return to that system as being the 'real solution' to inflation. He went as far as to say, 'I still believe that, *so long as the management of money is in the hands of government*, the gold standard with all its imperfections is the only tolerable safe system' (emphasis original).[34] He did not think, however, that a return to the gold standard was a practical proposition. He gave two reasons for this; first the gold standard was an international standard and international coordination would be required to reintroduce it and second, the gold standard relied on the 'mystique of gold' and 'the general belief that to be driven off the gold standard was a major calamity and a national disgrace'.[35] This attitude and belief had ceased to exist.

By the 1970s Hayek had come to support the denationalisation of money – choice in currency. Choice in currency is the idea that individuals should be able to transact in any currency or commodity that they choose.[36]

> There could be no more effective check against the abuse of money by the government than if people were free to refuse any money they distrusted and to prefer money in which they had confidence.

By exposing national currency to competition governments' would have to behave responsibly and maintain the value of their currency. Under such an arrangement, 'those countries trusted to pursue a responsible monetary policy would tend to displace gradually those of a less reliable character'.[37] Hayek did propose that various banks or other institutions issue their own currencies and that these currencies be allowed to trade alongside all other currencies. He also suggested that the notion of legal tender be abandoned, except that if the government were to issue its own currency that it should specify what currency be accepted for tax purposes, the settlement of debt, and the payment of torts. With some minor exceptions financial institutions do not issue their own currencies and the notion of 'legal tender' is still with us.

One critic of Hayek's proposal Douglas Jay wrote:[38]

> But in thinking you can take control of the currency out of the hands of modern elected governments, and put it in the hands of some mysterious wise men meditating in some ivory tower, Professor Hayek is flying in the face of reality. The public simply will not allow

[33] *Denationalisation of Money: The Argument Refined*, Hobart Special Papers (London: Institute of Economic Affairs, 1978), 91.
[34] Ibid., 126.
[35] *The Constitution of Liberty: The Definitive Edition*, 462.
[36] "Choice in Currency: A Way to Stop Inflation," in *New Studies in Philosophy, Politics, Economics and the History of Ideas,* (London: Routledge, 1976), 225.
[37] Ibid., 227.
[38] Douglas Jay, "Commentary," in *Choice in Currency: A Way to Stop Inflation* (London: Institute of Economic Affairs, 1976).

> control of money to be put beyond their control any more than control of laws or taxes. The only hope, even if a frail one, is to educate governments to act sensibly.

Jay's critique is quite prescient – it is not clear why trust should be placed in 'in the hands of some mysterious wise men'. On the other hand, that appears to be his only criticism of Hayek's proposal.

The current domestic and international financial monetary system does not immediately resemble what Hayek called for in his proposal – yet the monetary system does have remarkable similarities to Hayek's proposals. Governments' continue to issue their own currency, but most financial institutions issue their own credit cards. Individuals can, in many economies, hold a credit card from any bank in the world. Individuals can own bank accounts anywhere in the world – often denominated in (almost) any currency. Currencies do compete against each other in international markets and in many economies the US dollar has displaced the local currency as the currency of choice. Exchange controls have been lifted in many parts of the world, and the control of money is largely beyond public control. Individuals can chose to contract in any currency, yet in most advanced economies are happy to use the local currency. As Hayek indicated, 'unless the national government all too badly mismanaged the currency it issued, it would probably continue to be used in everyday retail transactions'.

At face value then it appears that bank issued credit cards can approximate Hayek's denationalized money proposal. There are, however, two vulnerabilities to this notion. First credit cards are subject to government regulation and censorship, and second credit cards require banks to resolve asymmetric information problems and as such involve trust within the banking system.

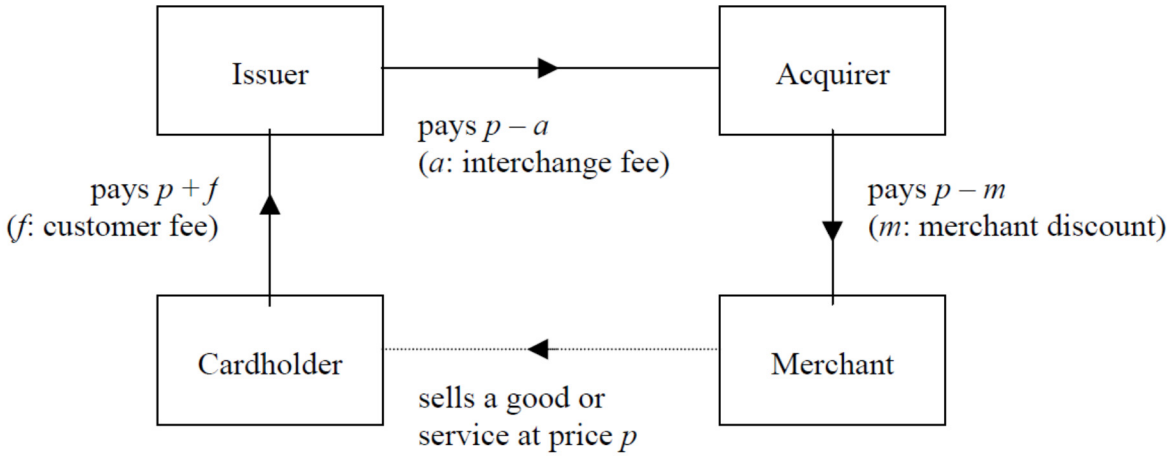
Governments around the world have used their regulatory powers to undermine the use of credit cards by alleging that so-called interchange fees are excessive or anti-competitive. Ronald Coase famously argued that "if an economist finds something – a business practice of one sort or other – that he does not understand, he looks for a monopoly explanation".[39]

Interchange fees and two-sided markets

Interchange fees are fees that banks charge each other as a result of their respective clients entering into a credit card transaction. The regulatory 'concerns' relate to excessive pricing, price fixing, abuse of market power, the creation of barriers to entry, increased consumers prices generally, and excessive use of credit cards relative to alternate payment methods.

[39] Ronald H Coase, "Industrial Organization: A Proposal for Research," in *The Firm, the Market, and the Law* (University of Chicago Press, 2012), 67.

Figure 4: The operation of an interchange fee



Source: Rochet and Tirole[40]

This depiction shows the net cash flows in the various relationships. The consumer (cardholder) buys goods and services from the merchant. The consumer then pays the price (p) and a net fee to his financial institution. The consumer's financial institution then pays the price (p) less the interchange fee (a) to the merchant's financial institution who then pays the merchant the price (p) less their own net fee. This depiction of the issue makes very plain that if both financial institutions are to remain profitable that m > a. The merchant pays the interchange fee. Of course, this is not surprising. The interchange fee exists to rebalance financial relationships within a market arrangement often described as being a two-sided market – sometimes also referred to as a platform economy.

Two-sided markets exist when two distinct groups of economic agents must be simultaneously satisfied to facilitate trade. The traditional media model is a typical and easily understood example. A platform (e.g. a newspaper) must simultaneously meet the needs of both advertisers and subscribers in order to be profitable. In the traditional media business model advertisers pay for the news, not subscribers. In the equivalent credit card model, merchants more often than not pay for the use of credit cards, not credit card users. This is due to consumers requiring more of an inducement to hold and use credit cards than merchants need to accept those cards. To argue that this relationship is somehow inefficient is to argue that consumers have monopoly power over merchants.[41]

In a competitive market for financial services, the interchange fee would be used to reduce the net consumer fee for credit cards.[42] The basic issue, then, is not one of monopoly exploitation, but rather is one of efficient contracting in the shadow of what 2009 economics

[40] Jean-Charles Rochet and Jean Tirole, "An Economic Analysis of the Determination of Interchange Fees in Payment Card Systems," *Review of Network Economics* 2, no. 2 (2003).
[41] For more discussion on this point see Sinclair Davidson and Jason Potts, "Australian Interchange Fee Regulation: A Regulation in Search of Market Failure," (International Alliance for Electronic Payments, 2015).
[42] See the corresponding case of debit cards see Mark Manuszak and Krzysztof Wozniak, "The Impact of Price Controls in Two Sided Markets: Evidence from Us Debit Card Interchange Fee Regulation," in *Working Paper* (Federal Reserve System, 2017).

laureate Oliver Williamson called the Fundamental Transformation that occurs in consequence of transactions that require both parties to make idiosyncratic investments – transforming ex ante competition into an ex post bilateral monopoly – that can subsequently give rise to opportunism.[43]

The credit payments system is not and cannot ever be an interlinked series of anonymous spot markets exchanging financial commodities because the information asymmetries and moral hazards inherent in these exchanges require the parties to the transactions to make idiosyncratic investments (also known as asset specificity) that bind them into a bilateral monopoly – i.e. the fundamental transformation – in which quasi-rents are only secured through mechanisms to inhibit opportunism by aligning incentives to long term relational contracting.

The interchange fee, we argue, has evolved as an efficient governance mechanism to achieve this outcome without requiring horizontal integration – i.e. collapsing the four party payments system into a three-party payments system, and the associated losses of technical and information efficiency and competition that would imply. Banks need to make transaction specific investments in acquiring information about the properties of customers and merchants, the value of which – the quasi-rent – is realised through a long term relationship.

Cryptocurrencies, like Bitcoin for example, are an even closer approximation to Hayek's notion of private money than are credit cards issued by private banks. In the very first instance cryptocurrency is less likely to be subject to government regulation and censorship than are credit cards. Furthermore cryptocurrencies – Bitcoin in particular – were developed for the very purpose of making them non-counterfeit (i.e. Bitcoin cannot be double-spent) and trustless. Depending upon the design of the cryptocurrency they may also be inflation-proof. This is especially the case if we accept the Hayekian argument that inflation is driven by government. Our argument is that cryptocurrency substantially reduces disorder costs within the monetary system; indeed it could also reduce dictatorship costs. Furthermore the blockchain while recording and facilitating transactions acts as an automatic clearing system, with clearance occurring on average every ten minutes, it becomes difficult to imagine what role, if any, the government or any of its agencies would play in the payments system if payments occur on the blockchain.

The important question is whether cryptocurrency can operate as money. In terms of the functions it can perform all three and does. The government has previously expressed some concerns around the use of Bitcoin:[44]

> The Australian Crime Commission's acting chief executive, Paul Jevtovic, says the virtual currency's anonymity makes it highly attractive to criminals and money launderers, though little is yet known about how widespread it is in illicit markets. Bitcoin has become of growing concern to the agency. "The ACC is currently working with partners to explore the

[43] Williamson.

[44] Ilya Gridneff, "More Than Play Money: A Virtual Currency Loved by Geeks Is Fast Becoming the Currency for Crooks," *Sydney Morning Herald*, 1 June 2013.

> Bitcoin market and other digital currencies, to better understand its size and criminal threat," he said.
>
> Meanwhile, Bitcoin is being used legitimately in Australia for everything from buying meat via online butcher Honestbeef to electronics at Gadget Direct, clothes from Patcht or books from Favoryta.

The problem being that those “concerns” are just as true for the use of cash.

> The Australian Crime Commission's acting chief executive, Paul Jevtovic, says [cash’s] anonymity makes it highly attractive to criminals and money launderers, though little is yet known about how widespread it is in illicit markets. [Cash] has become of growing concern to the agency. "The ACC is currently working with partners to explore the [cash] market and other […] currencies, to better understand its size and criminal threat," he said.
>
> Meanwhile, [cash] is being used legitimately in Australia for everything from buying meat via online butcher Honestbeef to electronics at Gadget Direct, clothes from Patcht or books from Favoryta.

An argument can be mounted that Bitcoin is too volatile to serve as a store of value or as a unit of account. Yet most government backed currencies are also somewhat volatile in value on the foreign exchange markets and all suffer from persistent inflation. By contrast, we believe that Bitcoin in particular is too valuable to use for day-to-day transactional purposes. That, however, does not preclude some or other cryptocurrencies being developed for day-to-day usage.

6. FROM PAYMENTS SYSTEMS TO CRYPTOBANKING

The introduction of cryptocurrencies into the payments systems is likely just the beginning of the more widespread adoption of blockchain for economic activity throughout the economy. Smart contracts provide an opportunity for financial institutions to be built directly on blockchain, as a ‘layer’ above the cryptocurrency. Such applications would take advantage of the immutability and cryptographic verifiability of the blockchain to algorithmically manage financial transactions and contracts.

To understand the possibilities blockchain offers the monetary and financial system, we should first consider how blockchains are likely to affect the accounting profession. As a Deloitte report published in 2016 outlined,

> Blockchain technology may represent the next step for accounting: Instead of keeping separate records based on transaction receipts, companies can write their transactions directly into a joint register, creating an interlocking system of enduring accounting records. Since all entries are distributed and cryptographically sealed, falsifying or destroying them to conceal activity is practically impossible. It is similar to the transaction being verified by a notary – only in an electronic way.
>
> The companies would benefit in many ways: Standardisation would allow auditors to verify a large portion of the most important data behind the financial statements automatically. The cost and time necessary to conduct an audit would decline considerably. Auditors

> could spend freed up time on areas they can add more value, e.g. on very complex transactions or on internal control mechanisms.[45]

This automated verification process would have significant consequences for regulatory and legal systems that currently rely on direct or third-party auditing. For example, governments impose prudential controls on banks in order to ensure that they have adequate liquidity and capital buffers in the case of an economic crisis. At the first instance, publicly verifiable and secure blockchains could lower the cost observing banks to ensure they are compliant with prudential requirements.

However, these blockchains also change the regulatory dynamics in more fundamental ways. One of the primary justifications for prudential regulation in banking is that shareholders and depositors lack the information to observe the financial practices and stability of their bank. Shareholders and depositors are therefore unable to impose market discipline on banking practices, freeing management to act recklessly with their funds, and consequently creating a need for external government regulation. As Barth, Caprio and Levine describe the perverse dynamic of a lack of information in banking,

> If depositors and other creditors cannot readily verify the condition of banks, the once some begin withdrawing funds, others, not knowing the condition of the bank, may also withdraw their funds, thereby setting in motion a bank run. And if a run is going on at one bank, unless there is an explanation that is specific to that institution, it can spill over to neighbouring banks.[46]

Barth, Caprio and Levine contrast this with a situation where there is "literally perfect information (all eventualities in the world known with certainty)" where runs would not occur. Banks tend to be less transparent than other firms as their assets are both non-physical and consist of long term liabilities. However, publicly verifiable blockchains go some way to reversing this. Algorithmically audited records of liabilities on a publicly verifiable blockchain has the potential to make financial firms significantly *more* transparent than firms which have their assets tied up in physical capital and real property. This application reduces information asymmetries between depositors and shareholders on the one side and bank management on the other, providing the former with the information necessary to impose market discipline.

An extension of this idea is what we call a cryptobank. As we have written, a cryptobank is

> an autonomous blockchain application that borrows short and lends long, perhaps matching borrowers with lenders directly. A cryptobank structured algorithmically by smart contracts would have the same transparency properties as the bank with a public blockchain ledger but with other features that might completely neglect the need for regulators. For example, a cryptobank could be self-liquidating. At the moment the cryptobank began trading while insolvent, the underlying assets would be automatically disbursed to shareholders and depositors.[47]

[45] Deloitte, "Blockchain Technology: A Game-Changer in Accounting?," (2016).
[46] Barth, Caprio, and Levine.
[47] Berg, Davidson, and Potts.

This is necessarily speculative. But it demonstrates the far reaching consequences of blockchain for the regulatory structures that have governed Australia's financial and monetary system for a century.

7. INDEPENDENT PAYMENTS REGULATION: THE UK MODEL

Australia has an opportunity to be a world leader in the adoption of blockchain technology. Australia's regulatory system is robust and (compared to many other developed countries) relatively adaptable. A number of Australian authorities are already investigating blockchain applications. In this paper we have discussed challenges and opportunities for integrating blockchains into the Australian payment system. Blockchains are in a state of rapid development. The question is what governance arrangement is best placed to oversee the introduction of cryptocurrencies and to bring about the necessary reform.

The RBA itself is an independent statutory authority, meaning that it is formally separated from the lines of delegation and accountability in a Westminster democracy.[48] This structure has a number of benefits and weaknesses. Central banks were the first independent regulators, instituted in this way under the belief that political incentives might harm the neutral application monetary policy.[49]

At the international level, the institutional framework for the implementation of payments system regulation varies considerably. Here we recommend the Australian government consider the institutional example of the United Kingdom, which has a structurally separate payments regulator.

The UK's *Financial Services (Banking Reform) Act 2013* created a new independent regulator for payments, Payment System Regulator (PSR). Until the 2013 legislation, payments regulation was governed largely by the Bank of England and the Financial Services Authority. The UK Treasury was empowered to designate a system as a regulated ('recognised') payment system. In addition the Payments Council existed as a self-regulatory body for firms involved in the payments system. In 2009 the Payments Council announced that cheques were to be phased out in a decade. Controversy surrounding this decision (which was reversed) led to a series of reviews that culminated in the 2013 reforms.

The 2013 reforms established the PSR as an independent body subsidiary to the Financial Conduct Authority. The PSR has its own statutory objectives and PSR board. The chair of the board is also the chair of the Financial Conduct Authority. The PSR is funded by a levy on the regulated payments firms. The industrial representation embodied by the former Payments

[48] For discussions on independent regulatory authorities, see Chris Berg, *Liberty, Equality & Democracy* (Ballarat, Victoria: Connor Court Publishing, 2015); *The Growth of Australia's Regulatory State: Ideology, Accountability and the Mega-Regulators* (Melbourne: Institute of Public Affairs, 2008).

[49] On the other side, independent regulators suffer a democratic legitimacy problem, as their powers derive from a democratic mandate but are not controlled democratically. Rather than relitigating that debate here, in this paper we assume the bipartisan agreement that monetary and payments system regulation ought to be independent is maintained.

Council is included in the Payment Systems Regulator Panel. This body is established by statute as an advisory panel, and takes positions that are independent of the PSR.

The United Kingdom provides a model for payments system regulation in Australia. It provides more legitimacy than the current arrangement: interchange fee regulation in particularly is a form of regulatory taxation, and ought not to be the province of the central bank. Vesting payments regulation in a dedicated regulatory authority would encourage greater regulatory expertise. The creation of the Australian Prudential Regulatory Authority in 1998 was driven by the recognition that the task of central banking and the task of financial regulation are distinct and can create conflicts of interest as single authorities try to balance the needs of one of its mandates against the other.

Finally, and more crucially for the blockchain economy, an independent payments system regulatory brings greater adaptability than the current system. As Potts and MacDonald have argued:

> The regulatory role cannot stand outside the design and implementation of the technology, thus requiring specialised competence. As a specialist in monetary policy, the RBA does not have, nor should it have, these technical capabilities in code development or platform design. The Payments System Board was never well-placed within the Reserve Bank of Australia because of the very different specialisations.
>
> These exciting developments in cryptocurrency as a new technology for payments furnish yet another reason why the Payment Systems (Regulation) Act 1998 should be repealed, and Payment Systems regulation moved to a specialist regulator.[50]

The analysis in this paper supports those recommendations. The United Kingdom's system of a dedicated payments regulator – potentially subsidiary to the Australian prudential regulator, APRA – provides a model for the Australian government to manage the introduction of blockchain financial services and cryptocurrencies into the Australian payments system.

8. CONCLUSION

The analysis in this paper suggests that the optimal regulatory control over cryptocurrencies in the payment system – indeed in the financial system in general – is likely to look significantly different than that which prevails in a pre-blockchain world. As we have argued, cryptocurrencies look a lot more like Friedrich Hayek's private banking and private money than the state fiat currency which has dominated the twentieth century financial system. Blockchain powered smart contracts will also reshape the structure of financial institutions. Blockchains are a potentially revolutionary technology that could shape almost every part of the political and economic system. The questions that policymakers will have to face as blockchain applications become more widespread are not just *how* government regulates, but *why* it regulates.

[50] Jason Potts and Trent MacDonald, "Who Should Regulate Bitcoin? Challenges and Opportunities for Blockchain Technology in Australia," (2016).

9. ABOUT THE AUTHORS

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