CHAPTER 7

A Modern Role for Intellectual Property Rights in Sustainable Finance, Prudential Banking and Capital Adequacy Regulation

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Abstract

With new insights regarding prudential financial regulation, this chapter contributes to the interdisciplinary literature[1] to support sustainable innovation finance and Sustainable Development Goal 9[2]in a market-based context. Yet to receive significant attention in the academic literature are the banking capital adequacy ratio (CAR) requirements and their impact on intangibles such as intellectual property rights (IPRs). The Basel Committee on Banking Supervision[3] and the Basel Accords[4] bank asset classification system are examined in the context IPRs which fall within the 'intangibles' asset class, nonphysical assets with potential benefit in the long term.[5] Through an analysis of the Basel Accords I-IV[6] and statements on monetary policy published in speeches of high-level central bank professionals,[7] we make an exploratory case to 'carve out' registered granted IPRs from the wider 'intangibles' asset class for prudential regulation purposes. The original analysis contemplates designing a sustainable innovation finance system to better support inventors, patent owners and SME operating companies beyond the venture capital milestone.

Keywords

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[1] *Facilitating Interdisciplinary Research* (2004) Committee on Facilitating Interdisciplinary Research, Committee of Science, Engineering and Public Policy, National Academic Press, Washington.

[2] The United Nations Sustainable Development Agenda, available at https://www.un.org/sustainabledevelopment/development-agenda/ accessed on November 2019

[3] The BSBS was established in 1974 and issued the first Basel Accord in 1988 followed by the second, third and fourth of the Basel Accords over the next two decades.

[4] Although they have no legal force, the Basel Accords are voluntarily adopted by member nations, see https://www.bis.org/bcbs/about/overview.htm?m=3%7C14%7C573 accessed on 18 June 2020.

[5] Chris. B. Murphy, 'How do tangible assets differ from intangible assets?' (8 May 2019) Investopedia https://www.investopedia.com/ask/answers/012815/what-difference-between-tangible-and-intangible-assets.asp accessed on 11 January 2020.

[6] Supra n [3]

[7] P. Goodridge, J. Haskell and G. Wallace, UK Intangible Investment and Growth: New measures of UK investment in knowledge assets and intellectual property rights (September 2016) Research commissioned by the Intellectual Property Office available at https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/554480/Investment-in-Intangibles.pdf accessed on 30 May 2020.

Basel Accords 1- IV, capital regulation, intangibles, intellectual property, SDG 9, sustainable innovation finance.

1 Introduction

Technological innovation and capitalism have rapidly transformed our planet, raising our living standards whilst degrading the environment. The most striking impact of the advance of human-created technological progress on the natural environment is climate change.[8] The planet will only be sustainable if it can continue to exist indefinitely into the future. Sustainability is broadly understood to comprise development that meets the needs of the present while safeguarding Earth's life-support system as set out in the United Nations 2030 Sustainable Development Agenda.[9] There is an urgent need for a wide variety of innovations to solve problems on a global scale. One of the multi-faceted aspects of sustainable development in a market-based context, is role that intellectual property rights (IPRs) play in incentivizing new knowledge and fiscal regulatory policy. How banks provide innovation firms with credit, while mitigating their own risk, is an ongoing challenge with both short and long-term implications.[10] With new insights regarding the role of prudential financial regulation treatment of intangibles and IPRs, this chapter aims to make an original contribution to the interdisciplinary literature[11] regarding Sustainable Development Goal 9 (SDG 9)[12] to promote inclusive and sustainable industrialization while fostering innovation.[13]

In terms of the impact of climate change, to avoid adverse impact on financial infrastructure, the World Bank estimates that global warming needs to be limited to no more than 2 degrees Celsius.[14] Many in the finance sector are concluding that traditional tangible loan security,

[8] For research and data about climate change, see the Intergovernmental Panel on Climate Change at https:/ tinyco.re/8844088) access on 27 February 2020. The human cause and the reality of climate change are accepted in the scientific community.
[9] See https://www.un.org/sustainabledevelopment/ accessed on 3 March 2020
[10] COVID-19: How global trade finance is being disrupted and redefined webcast (3 June 2020) Ernst and Young Global Limited, available at https://www.ey.com/en_gl/webcasts/2020/05/covid-19-how-global-trade-finance-is-being-disrupted-and-redefined, accessed on 5 June 2020.
[11] *Facilitating Interdisciplinary Research* (2004) Committee on Facilitating Interdisciplinary Research, Committee of Science, Engineering and Public Policy, National Academic Press, Washington.
[12] The United Nations Sustainable Development Agenda, available at https://www.un.org/sustainabledevelopment/development-agenda/ accessed on November 2019
[13] Ibid
[14] 'Climate Change' The World Bank, available at https://www.worldbank.org/en/topic/climatechange accessed on 18 June 2020

notably land and buildings, is under threat from climate change. For example, nearly 12% of land in England is adjacent to a river or a stream with increased vulnerability to flooding[15] due to climate change, posing a considerable financial risk to the UK financial sector and the mortgage market. At a global level, the impact of climate change is currently being studied by 50 of the world's central banks (including the Bank of England) through the Network for Greening the Financial System.[16] In May 2020 the Network published its *Status report on financial institutions' practices with respect to risk differential between green, non-green and brown financial assets and a potential risk differential.*[17] The *Financing for Sustainable Development Report 2020*[18] provides policy guidance and states that a key action needed is to "accelerate long-term investment in resilient infrastructure for sustainable development through public investment and incentives for the private sector". Sir Roger Gifford, Chair of the Green Finance Institute and Senior Banker, *Skandinaviska Enskilda Banken* (SEB) warns, "It is critical that financial markets and policymakers collaborate to create the solutions to move the global economy towards a more sustainable future."[19] One solution, to be explored in sections 2-4 below, may be for prudential banking regulation policy makers to revise their approach to bank asset credit risk and intangible registered, granted IPRs.

An independent report commissioned by the UK Intellectual Property Office found that intangible investment in the UK was 9% greater than tangible investment in 2014 at £133bn and £121bn respectively.[20] IPRs are designed to work as legal instruments within an

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[15] According to the UK National Planning Policy Framework, "flood risk" is a combination of the probability and the potential consequences of flooding from all sources – including from rivers and the sea, directly from rainfall on the ground surface and rising groundwater, overwhelmed sewers and drainage systems, and from reservoirs, canals and lakes and other artificial sources, see https://www.gov.uk/guidance/flood-risk-and-coastal-change accessed on 13 June 2020.

[16] In 2017 at the Paris "One Planet Summit" eight central banks and supervisors established the Network of Central Banks and Supervisors for Greening the Financial System. Since then the NGFS has grown to include central banks from five continents. The NGFS aims to enhance the role of the financial system to manage risks and to mobilize capital for green and low-carbon investments in the broader context of environmentally sustainable development, see https://www.ngfs.net/en, accessed on 14 June 2020.

[17] *A Status Report on Financial Institutions' Experiences from working with green, non-green and brown financial assets and a potential risk differential* (May 2020) NGFS / *Banque de France* available at **https://www.ngfs.net/sites/default/files/medias/documents/ngfs_status_report.pdf**, accessed on 13 June 2020

[18] United Nations, Inter-agency Task Force on Financing for Development, Financing for Sustainable Development Report 2020. (New York: United Nations, 2020), available from: https://developmentfinance.un.org/fsdr2020, accessed on 30 April 2020.

[19] Established in 2019, the Green Finance Institute is an independent, UK-based, commercially focused organization, supported by seed funding from HM Treasury (UK), the Department of Business, Energy and Industrial Strategy and the City of London Corporation.

[20] P. Goodridge, J. Haskell and G. Wallace, UK Intangible Investment and Growth: New measures of UK investment in knowledge assets and intellectual property rights (September 2016) Research commissioned by

environment comprising other legal mechanisms and have proven to be robust against time and societal development. However, prudential banking regulation has yet to fully consider the modern role of intangible assets and IPRs in business and the economy and as bank assets. Founded in 1974, the BCBS is an international forum where members cooperate on banking supervision matters to enhance financial stability through voluntary regulations, known as accords. The Basel I-IV Accords set out a framework for how banks and depository institutions must calculate their capital adequacy ratios (CARs) when lending against all types of loan security. According to the BCBS, the minimum capital ratio framework has been introduced in member countries and across the globe in virtually all other countries with active international banks.[21] The Basel I Accord was issued in 1988 introducing a clear focus on the capital adequacy of financial institutions, creating a classification system for assets. While the IPR legal framework has significantly evolved since 1988, the capital adequacy regulation applied to intangibles assets (a class which includes unregistered and registered IPRs) has not altered. The increase in economic investment in intangibles in the UK, in the author's view, supports a re-think on the relationship between banking capital adequacy ratio (CAR) buffers and their impact on intangibles and IPRs as loan security and as an important component of sustainable innovation finance (see sections 2.1 and 2.2 below).

Within the class of intangibles, the subset of registered granted patents, for example, may provide a more resilient and legally certain store of value/capital for the purpose of secured business loans and banking capital adequacy requirements than previously thought (see section 2.3 below). However, in terms of banking prudential regulation, while registered granted IPRs are legally constructed and state-sanctioned monopoly rights, they are currently treated the same as other more nebulous intangibles such as goodwill and other unregistered intangibles such as knowhow, confidential information and trade secrets. In the author's view, it is timely to consider unbundling this wide asset class to provide an improved categorization of intangibles. The wider class of intangibles could be refined and better classified so that it more accurately reflects improvements in the modern IPR legal framework, the global commercial reality of corporate IPR investment and bank credit risk.

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the Intellectual property Office available at https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/554480/Investment-in-Intangibles.pdf accessed on 30 May 2020.

[21] J. Chen, 'Basel I' (8 March 2020) available at https://www.investopedia.com/terms/b/basel_i.asp accessed on 18 June 2020.

In this chapter, we will explore the level of risk assigned to granted patents and other granted IPRs for CAR purposes with a view to designing sustainable finance in support of SDG 9. We aim to make out a case and found the basis for a recommendation that central banking regulators review their prudential capital regulation approach to intangible registered, granted IPRs assets (patents, designs and trade marks) as loan security and re-consider the risk weighting assigned to this class within a class of intangible bank assets.

The remainder of this chapter contemplates designing a sustainable innovation finance system that will better support inventors, patent owners and SME operating companies, beyond the venture capital milestone. One component of the sustainable innovation finance design that has yet to receive significant attention in the academic literature is banking capital adequacy ratio (CAR) risk weighting requirements and their impact on approval of intangible and innovation finance. In *Intellectual Property, Finance and Corporate Governance* I introduced the issue in Chapter 3, section 3.5 Basel III Banking Capital Adequacy Requirements: an adverse impact on IP finance.[22] This chapter provides an opportunity for a more in depth exploration of the Basel Accords I-IV[23] and developments in the IPR framework, with a focus on patent law by way of illustration. The finance sector is a complex area. Recognizing that sustainable development is a global responsibility and there are indeed problems concerned with seeking global solutions to the IPR/banking regulation interface, this original analysis introduces and explores, from an interdisciplinary IP and banking law perspective, the adverse impact of prudential regulation on innovation finance as it currently applies to loan transactions secured by intangibles. In short, the BCBS the regulatory adjustment to Common Equity Tier 1 regulatory capital requires that goodwill and *all other intangibles* (including IPRs) must be deducted in the calculation of Common Equity. This regulation makes the loan pricing or interest rate offered more expensive. As such, lending against intangibles and IPRs is less attractive as they are not considered assets realisable on default. As such, there is potential for cooperation between policy makers in the fields of IPR and banking regulation to work together at both the international and national level.

[22] J Denoncourt, *Intellectual Property, Finance and Corporate Governance* (2018) Routledge Taylor Francis Research in Intellectual Property Series, pp-76-78; partially derived from J. Denoncourt, Patent-backed debt finance: Should company law take the lead to provide a "true and fair" view of SME patent assets (2015) PhD Thesis, University of Nottingham.

[23] The second, third and fourth of the Basel Accords issued by the Basel Committee on Banking Supervision.

The structure of this chapter is as follows. In the next section, in order to provide a foundation for our interdisciplinary study of how CARs apply to intangible IPR loan security and could be reformed, a brief primer on banking and capital adequacy requirements is provided. In section 2.4 we analyse the implications of Basel III and IV for IPRs and hypothesize that the security potential of modern registered IPRs such granted patent, trade mark and design monopolies is underestimated. Intangibles are a wide asset class, it will be argued, that could be unbundled and better categorized to more accurately assign risk in a prudential lending context. In section 3, we undertake a qualitative non-doctrinal analysis of statements and thinking on the topic of monetary policy and intangibles as published in the speeches of various high-level central bank professionals. The speeches qualitatively reviewed include those given by: Mr Muhammad bin Ibrahim, Deputy Governor of the Central Bank of Malaysia (Bank Negar Malaysia); Mr Mario Drago, President of the European Central Bank (ECB)**;** Mr Philip R Lane, ECB Executive Board Member; and Professor Jonathan Haskel, External Member of the Bank of England Monetary Policy Committee. The critical discussion sheds light on the unique commercial monopoly advantages provided by modern registered IPRs and builds a rationale for arguing they should be 'carved out' of the intangibles asset class or be considered a distinct sub-set thereof. Finally, section 4 considers the impact of climate change and flood risk on the quality of residential mortgages in the UK as security. We further elaborate the case for treating registered IPRs differently to the wider class of intangible assets (e.g. goodwill and unregistered IPRs) in view of the modern IPR framework and valuation methodologies. Final conclusions and recommendations are set out in section 5.

2 Commercial banks and banking capital adequacy ratios (CARs)

This section provides context, explaining the relevance of capital adequacy ratios for intangible assets used as loan security and how banking regulation interrelates with IP rights. We introduce the national and international monetary policy institutions responsible for the banking monetary policy and the capital regulation framework. In essence, a commercial bank is a financial intermediary, an institution that accepts deposits from savers, extends loans to borrowers and provides a range of other financial services to its customers.[24] The largest portion of the funds raised by the bank are used to grant loans to individuals or businesses,

[24] J Goddard and John O.S. Wilson, *Banking: A Very Short Introduction* (2016) Oxford University Press, p 1.

generating a future stream of interest payments from borrowers to the bank.[25] The difference between the bank's total assets and its liabilities, in the form of funds raised from depositors and investors, is the bank's capital (also known as equity or net worth). For a bank to remain solvent, the value of its assets much always exceed the value of its liabilities.[26] Goddard and Wilson explain that most commercial banks are privately owned by shareholders who seek to earn a profit.[27] By acting as a financial intermediary, a bank takes on many risks,[28] one of which is credit risk - the risk that a borrower will fail to repay the loan. If there is no prospect of the borrower repaying, the bank must reduce the value of the assets shown on its balance sheet. An equivalent reduction must also be shown on the liabilities side of the balance sheet, by reducing the bank's capital. The bank's capital therefore provides a buffer or cushion, enabling it to absorb losses on its loans or other investments. If the bank's capital is wiped out altogether by losses on loans or other investments, the bank becomes insolvent. A useful measure of a bank's loss-absorbing capacity is the capital-to-assets ratio known as the capital adequacy ratio (CAR), defined as the ratio of the bank's capital to its total assets.[29] Leverage or gearing is measured by the reciprocal of the CAR: total assets divided by capital. A bank with a capital ratio of 5 (the bank's total assets are 10x its capital) could potentially absorb a 5% drop in the value of its assets and still be solvent. The higher the leverage, the smaller the capital buffer or cushion and the greater the risk of insolvency.[30] [31] The bank's executive management team often face a conflict between the competition objectives of maximizing the bank's profitability and minimizing the risk of insolvency, at these times they are guided in their decision making by monetary policy and banking regulation.[32]

2.1 The Banks of England, a central bank and monetary policymaker

The Bank of England is the UK government's bank and since 2012 has been responsible for the regulation and supervision of banks and other financial institutions in the UK.[33] It is the

[25] Ibid p11
[26] Supra n [7]
[27] Supra n [7]
[28] Other important risks include liquidity, operational, settlement, currency, and sovereign or political risk.
[29] Supra n[7]
[30] Supra n[7]
[31] The implications of credit risk can be explored by running a stress test, essentially hypothesizing losses and the impact of same on the bank's capital base.
[32] Supra n[7]
[33] The European Central Bank is the central bank to the Eurozone; the US has 12 Federal Reserve Banks, the most important of which is the Federal Reserve Bank of New York.

country's central bank that manages money supply,[34] interest rates and commercial bank CARs, the latter via the Prudential Regulation Authority ('PRA').[35] Prudential regulation rules require financial firms to maintain sufficient capital and have adequate risk controls in place.[36] The Capital Requirements Directive IV (CRD IV) is an EU legislative package covering prudential rules for banks, building societies and investment firms.[37] The principle of independence means that Bank of England's Monetary Policy Committee should take decisions that cannot be overridden or reversed by politicians.[38]

2.2 Supervision of the banking industry and capital adequacy regulation post-2008

In 2008, following the global financial crisis,[39] after writing off delinquent loans or writing down the value of other assets commercial banks seeking to restore their capital-to-assets ratios cut back aggressively on their lending to small businesses and other borrowers. Banking capital regulation requires that a sufficient fraction of the bank's investments or assets be funded by un-borrowed money.[40] As noted in section 2.1 above, the difference between total assets and total liabilities is a key indicator of solvency of a bank.[41] The legally mandated banking CARs were made higher under Basel III banking rules (see s.2.2 below) to ensure stronger buffer and ability to absorb shocks in the long term by increasing the size of capital reserves a bank must hold against losses.[42] As commercial banks use bank deposits (liquid liabilities) to finance banks loans (illiquid assets) and only hold a small proportion of their assets as reserves (capital), together with leverage, this make banks inherently precarious entities.[43] Further, one distressed bank can cause the loss of confidence in the others and the banking system as a whole, a formidable justification for the supervision and regulation of individual banks.[44] As a result, a suite of banking capital regulations were introduced in 1988 by the Basel Committee

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[34] Commercial banks borrow from the Bank of England which services the UK's banking system.
[35] The Bank of England's PRA is responsible for this prudential regulation and supervision of around 1,500 banks, building societies, credit unions, insurers and major investment firms, see https://www.bankofengland.co.uk/prudential-regulation accessed on 14 April 2020
[36] Ibid
[37] Until the UK exits the EU on 31 December 2020, EU law will continue to apply. The new legal and regulatory capital framework will be updated thereafter.
[38] Supra n[7]
[39] *The Run on the Rock Fifth Report of Session 2007-2008 House of Commons Treasury Committee* (2008) Vol. 1, House of Commons London: The Stationer Office Ltd, pp4-20.
[40] Supra n[23] p76
[41] Supra n[3]
[42] International Regulatory Framework for Banks (Basel III): Capital (June 2011) Based Committee for Banking Supervision, Bank for International Settlements
[43] Supra n[3]
[44] Supra n[3]

on Banking Supervision (BCBS) at the Bank for International Settlements (BIS) based in Switzerland.

2.3 The Basel Committee on Banking Supervision (BCBS)

Banks have been through difficult times in recent decades with dampened demand for banking services, unusually low interest rates and flat yield curves.[45] The BCBS was established in 1974 following acute disturbances in the international currency and banking markets. It has since responded to the deficiencies in banking regulation that emerged during the 2007-2008 global financial crisis.[46] At the international level, the BCBS is the primary global standard setter for the prudential regulation of banks and provides a forum for regular cooperation on banking supervisory matters.[47] Its 45 members comprise central banks and bank supervisors from 28 jurisdictions including the UK.[48] The EU Capital Requirements Directive IV (CRD IV) applies to the EU member states.[49] The BCBS mandate is to strengthen the regulation, supervision and practices of banks worldwide with the purpose of enhancing financial stability.[50] It also provides a forum for cooperation on banking supervisory matters in relation to risk management of the global banking sector.[51] While the BCBS does not possess any formal legal supranational authority and its decisions do not have legal force, the Committee's decisions and guidance are highly regarded and rely on their members' voluntary commitments and responsibilities.[52] The EU CRD IV implements the Basel III Accord in the EU and comprises the: (1) Capital Requirements Directive (2013/36/EU) (CRD) which must be implemented through national law; and (2) Capital Requirements Regulation (575/2013) (CRR), which is directly applicable to firms across the EU.

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[45] B. Bogdanova, I. Fendr, and E. Takats 'The ABCs of PBRs: What drives price-to-book ratios' (11 March 2018 BIS at https://www.bis.org/publ/qtrpdf/r_qt1803h.htm accessed on 13 April 2020.
[46] Supra n[40]
[47] See the BCBS Overview section at https://www.bis.org/bcbs/ accessed on 5 January 2020.
[48] Ibid
[49] The EU text was formally published in the Official Journal of the EU on 27 June 2013 (as amended). The bulk of the rules contained in the legislation are applicable from 1 January 2014.
[50] The BCBS Charter at https://www.bis.org/bcbs/charter.htm accessed on 5 January 2020.
[51] Ibid
[52] Supra n[51] Section 5

2.3 Background to the Basel I, II and III Accords package of regulatory reforms: EU CRD IV and intangibles

The BSBC has published banking regulations, known as the Basel Accords since 1998. The Accords provide recommendations on banking regulations with respect to capital, market and operational risk with a view to ensuring that financial institutions have adequate capital on account to meet obligations and absorb unexpected losses. Tiers of bank capital (setting the quality and mount of capital a bank must hold) for large financial institutions originated with Basel I. We briefly summarise the developments introduced by the Basel regime below.

The first Basel Accord: Basel I the Capital Accord

Focussing on mitigating underlying credit risk, Basel I required international banks to maintain a minimum amount (8%) of capital, based on a percent of risk-weighted assets.[53] Basel I classified a bank's assets into five risk categories ranging from 0% (no risk, e.g. cash, central bank and government debt), 10%, 20%, 50% through to 100% risk, based on the nature of the debtor[54]. For example, risk classification is elastic and public sector debt can be placed between 20% - 50%, depending on the debtor. A residential mortgage is placed in the 50% - 100% risk category.[55] The 100% bank asset risk category applies to real estate, plant and equipment and capital instruments issued at other banks (e.g., government debt, development bank debt, private-sector debt, etc).[56] A degree of variability in risk-weighted assets already exists in practice.[57] Generally, a bank with a high capital adequacy ratio is considered safe and likely to meet its financial obligations.[58]

The second Basel Accord: the new Capital Framework

Basel II was published by the BCBS in 2009 following the 2008 financial crisis. It focused on minimum capital requirements (CARs) and on regulatory supervision and market discipline. Basel II highlighted the division of eligible regulatory capital of a bank into three tiers. According to BIS, the components of regulatory capital include Common Tier 1 capital,

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53 Mona A. Elbannan, 'The Financial Crisis, Basel Accords and Bank Regulations: An Overview' (December 2017) Vo.7, Issue 2 *International Journal of accounting and Financial Reporting*, pp 225

54 Ibid

55 Supra Elbanann

56 *History of the Basel Committee* at https://www.bis.org/bcbs/history.htm accessed on 21 June 2020

57 Ibid

58 B. Beers, 'What Does a High Capital Adequacy Ratio Indicate?' (30 July 2019) at https://www.investopedia.com/ask/answers/040115/what-does-it-mean-when-company-has-high-capital-adequacy-ratio.asp accessed on 13 April 2020.

the core capital of a bank, which includes equity capital and disclosed reserves. This type of capital absorbs losses without requiring the bank to cease its operations; Tier 2 capital is used to absorb losses in the event of a liquidation.[59] Common Tier 1 capital is intended to measure a bank's financial health; a bank uses Tier 1 capital, the highest quality of regulatory capital, to absorb losses immediately as they occur without ceasing business operations. Tier 2 capital is supplementary (e.g., less reliable than Tier 1 capital.) A bank's total capital is calculated as a sum of its Tier 1 and Tier 2 capital. Regulators use the capital ratio to determine and rank a bank's capital adequacy. Tier 3 capital consists of Tier 2 capital plus short-term subordinated loans – it is tertiary capital, which many banks hold to support their market risk, commodities risk, and foreign currency risk. Tier 3 capital includes a greater variety of debt than tier 1 and tier 2 capital. Each Tier has a specific set of criteria that capital instruments must meet before their inclusion in the respective Tiers. [60]

The Third Basel Accord: Basel III Responding to the 2007-2009 Crisis

Basel III builds on the structure of Basel II but imposes high quality and higher levels of capital and liquidity, thereby increasing oversight and risk management of the banking sector.[61] High quality capital is stated to be predominantly in the form of shares and retained earnings that can absorb losses.[62] Basel III mandates the current capital adequacy requirements with which banks need to comply when lending against intangibles.[63] Before Basel III the solvency ratio was only 2%. Under the 2011 reforms, banks had to progressively reach a higher minimum solvency ratio of 7% (calculated by dividing regulatory capital by risk weighted capital) by 2019.[64] In my earlier research published in *Intellectual Property, Finance and Corporate Governance* (2018), I identified that Basel Accord CARs have an adverse impact on the use of IPRs as a form of loan security and thus engagement with IPR-backed debt finance.[65] This chapter adopts an interdisciplinary approach to provide a deeper examination of this barrier to

[59] Ibid
[60] 'Definition of Capital in Basel: Executive Summary' The Bank for International Settlements (BIS) at https://www.bis.org/fsi/fsisummaries/defcap_b3.htm accessed on 13 April 2020. BIS is owned by 62 central banks representing countries that together account for about 95% of world GDP.
[61] In 2009, the Basel Committee issued the 'Principles for sound liquidity risk management and supervision' guidance.
[62] Supra n[56]
[63] Supra n[56]
[64] Basel III: A Global Regulatory Framework for more Resilient Banks and Banking Systems (December 2010, Revised June 2011) BCBS, Bank for International Settlements, pp6-23.
[65] Supra n[23] Chapter 3, s3.5, pp 76-78.

sustainable innovation finance as a component of the sustainable development debate.[66] In the banking, finance and accounting domain, IPRs form part of the wider asset class known as intangibles, nonphysical assets with potential benefit in the long term in contrast with tangible assets such as current assets (usually used within a year) and fixed assets (used for over a year) and are subject to International Accounting Standard (IAS) 38 Intangibles.[67] Under Basel III, all intangibles are treated as low quality security. As an asset class, all types of intangibles are rated as riskier types of assets (e.g. even registered granted patents, trade marks and designs). The definition of 'capital' in a banking context, means that intangibles, including registered, granted state-sanctioned IPRs, must be deducted from the bank's regulatory capital. As such, registered patents, registered trade marks and other IPRs (registered and unregistered) cannot generally be counted towards the loan's security[68] as regulatory capital assets as they are considered too difficult to value.[69] This rationale is arguably out-dated and is the friction point where capital regulation meet IP particularly in developed countries. While IPR valuation is a specialist field, there are methodologies for valuing IPRs for a variety of purposes, including credit risk. An IPR portfolio valuation is comprehensive and considers legal dynamics from a qualitative and accounting perspective. Established IPR valuation methodologies have continued to evolve, are widely used in the private sector and will be discussed in section 2.4. With respect to goodwill and other intangibles, according to the BCBS, the regulatory adjustment (underlined for emphasis) to be applied to Common Equity Tier 1 regulatory capital must be applied as follows:

> *Goodwill and other intangibles (except for mortgage servicing rights)*
> *67. Goodwill and all other intangibles must be deducted in the calculation of Common Equity Tier 1 capital, including any goodwill included in the valuation of significant investments in the capital banking, financial and insurance entities that are outside the scope of regulatory consolidation. With the exception of mortgage servicing rights, the full amount is to be deducted net of any associated deferred tax liability which would*

[66] M. Bezant, 'The use of intellectual property as security for debt finance' (2003) 1(3) *Journal of Knowledge Management*, pp237-263.
[67] Supra n[7]
[68] Security (or collateral) is an asset that a borrower pledges to a lender as security for a loan. If the borrower is unable to repay the loan payments as they fall due, the lender can take ownership of the asset.
[69] Brooke Masters, Banks eye intangible assets as collateral (11 June 2020) *The Times*, available at https://www.ft.com/content/80c23e56-b08f-11e1-8b36-00144feabdc0

be extinguished if the intangible assets become impaired or derecognized under the relevant accounting standards.[70]

In regulation 67 above, IPRs are not specifically mentioned either as part of the goodwill and intangibles asset class, nor are they treated elsewhere differently to goodwill and other intangibles. All intangibles are considered from a one-size-fits-all approach. In the author's view it is timely to unbundle this wide asset class. The wider class of intangibles could be refined to more accurately reflect the modern commercial reality of corporate IPR ownership (especially registered granted IPRs which are legally constructed and state-sanctioned monopoly rights) and revise or relax the level of risk they attract for CAR purposes. Corporate investment in acquiring and exploiting IPRs continues to increase across the world[71] and is a core aspect of business strategy and economic productivity. Earlier in this chapter we recognised that finance of innovation is paramount to promote and fulfil SDG 9. IP rights alone will not support innovation, rather sustainable development will benefit from other relevant policy including financial regulation.

2.4 Implications of Basel III and IV for IPRs as loan security

The implications of Basel III for intangibles and IPRs as loan security is the higher level of "risk-weighting" that applies to intangible asset security (collateral) in contrast with other forms of assets such as cash or currency that are considered zero risk. The term 'intangibles' refers to the type of capital that one cannot easily touch or measure, for example, investments in software, databases, research and organisational processes, as opposed to tangible investment in items such as hardware, machines and equipment.[72] If loans are secured against intangibles such as patents and trade marks, the bank is legally obliged to make appropriate capital adequacy provision.

Basel III provides for a comprehensive list of regulatory adjustments and deductions from regulatory capital. These deductions typically address the high degree of uncertainty to be applied to the whole category of intangibles which are thought to lack positive realisable value

[70] International Regulatory Framework for Banks (Basel III): Capital (June 2011) BCBS, Bank for International Settlements, pp21-22.
[71] Supra n[4]
[72] Capital can be defined in several ways. 'Working capital' refers not to an asset, but to a firm's cash. A non-business capital asset would be a family home (a non-business building). Personal savings are financial assets, not capital assets.

(illiquid) in periods of stress and are mostly applied to Common Tier 1 capital. We saw that in the Basel III definition of capital at section 67, important deductions are goodwill and other intangible assets (included registered and unregistered IPRs, deferred tax assets and investments in other financial entities.[73] Essentially, this makes the loan pricing or interest rate offered more expensive and lending against intangibles simply less attractive, but not unlawful, so long as the bank meets or exceeds the required CAR.

Basically, Basel III regards the whole class of intangible assets when applied as loan security as "high risk" assets that should be treated carefully[74] and regulatory adjustment made i.e. not included in the bank's capital for CAR purposes. Brassell explains that that intangible assets do not exhibit the same behaviour as tangible assets which can be traded on transparent and liquid markets, the sale price generally predicted with a degree of confidence.[75] The IPR market landscape is evolving however, and there are now increasing numbers of alternative IPR platforms from which to derive pricing data to assist regulators and individual banks with IP-rich clients to risk rate IPRs with confidence. Other developments in the IPR system, relevant to IPR risk rating will be discussed further below.

Meanwhile, the BCBS expects full implementation of its standards by BCBS members and their internationally active banks[76] into local legal frameworks through each jurisdiction's rule-making process within the pre-defined timeframe established by the Committee. BCBS Guidelines elaborate the standards in areas where they are considered desirable for the prudential regulation and supervision of banks, especially internationally active banks. 'Sound practices' bulletins generally describe actual observed practices, with the goal of promoting common understanding and improving supervisory or banking practices.[77]

In summary, the Basel I – IV regulatory framework includes a global, *voluntary* regulatory standard on capital adequacy regulation to make banks better placed to absorb financial

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[73] 'Definition of Capital in Basel: Executive Summary' The Bank for International Settlements (BIS) at https://www.bis.org/fsi/fsisummaries/defcap_b3.htm accessed on 13 April 2020.
[74] Definition of Basel III, *Financial Times Lexicon* at http://lexcion.ft.com//term?term=basel-iii
[75] M. Brassell, 'Unlocking bank finance for intangible assets: New models of support' (9 June 2017) NESTA available at https://www.nesta.org.uk/blog/unlocking-bank-finance-for-intangible-assets-new-models-of-support/ accessed on 1 June 2018.
[76] BCBS standards constitute minimum requirements and BCBS members may decide to go beyond them.
[77] See the Principles for the Sound Management of Operational Risk (30 June 2011) at https://www.bis.org/publ/bcbs195.htm accessed on 15 April 2020.

shocks in the long term, by increasing the size of capital reserves a bank must hold against losses.[78] To date, Basel III capital adequacy regulatory ratios have been perceived by banks as a major barrier to the development of sustainable innovation finance secured by IPRs and intangibles.[79] Richard McCarthy, UK Head of Banking at KPMG said, "We have to remember that banking requires risk-taking, yet in the rush to clean up the past, both banks and regulators have lost sight of this."[80] In other words, in addition to resilience, banks must have a degree of risk-tolerance and arguably, treat certain types of intangibles such as expertly examined, state sanctioned, registered IPRs more favourably as a form of capital. Unbundling the definition of intangibles and carving out registered, granted IPRs could be a potential financial solution to supporting sustainable finance. According to Brassell and King, authors of *Banking on IP* (2013), "The more visible it [IP] becomes in the public accounts, the easier its value becomes to realize. This will lead to greater opportunities for lenders – and higher risks of inaction."[81] Similarly, the more visible IPRs are as a subset or separate category of intangible loan security, the easier its value as potential as loan security will be to realize. With the goal of sustainable development in mind, it would be helpful to consider the interaction between the banking regulatory ecosystems, IPRs and innovation finance and encourage greater dialogue and understanding the impacts and constraints the former has on the latter. A high-level expert working group could be tasked by the BCBS with producing an IP Finance Guideline to support sustainable innovation finance, especially for adoption in developed countries. The next section reviews the literature on banking regulation, intangibles and IPRs from the perspective of central banks beginning with an analysis of extracts from published speeches by central banks personnel since 2014.

3. Qualitative analysis of high-level published statements concerning intangibles, IPRs and innovation by Central Bank personnel

For this section, the literature review involved examining high level speeches published by EU and UK central bank personnel since 2014 with a view to capturing relevant statements

[78] 'International Regulatory Framework for Banks (Basel III): Capital' (June 2011) *Basel Committee for Banking Supervision, Bank for International Settlements*

[79] See B. Amable, J.B. Chatelain, K. Ralf, 'Patents as collateral' (2010) *Journal of Economic Dynamics & Control*, 34: 1092-1104; Brian, W.J., 'Using intellectual property to secure financing after the worst financial crisis since the Great Depression' (2010) 15 *Intellectual Property L. Rev.* p449.

[80] L. Eccles, 'How bank lending fell by £365 Billion in five years' (7 September 2014) *Daily Mail*.

[81] M. Brassell and K. King, *Banking on IP? The role of Intellectual Property and Intangible Assets in Facilitating Business Finance Final Report* (6 November 2013) Independent report commissioned by the UK Intellectual Property Office, p 15.

regarding intangibles, IPRs as an aspect of capital adequacy regulation. Interdisciplinarity, in the academic sense used here, involves new thinking across the fields of prudential banking regulation, intangible property as security for lending and the intellectual property law framework. The purpose was to identify, document, enumerate and critically evaluate the references that shed light on what central bank thought leaders and policy makers are publishing on this contemporary issue. Presenting the views and attitudes of senior officials from Central Banks on the thorny issue of intangibles and IPRs as part of monetary policy may demonstrate support for more research and/or a formal review of prudential capital regulation approach to IPRs as loan security. In the author's view the extracts from the speeches below demonstrate keen awareness of the financial barriers to innovation finance, a key step that will move central banks to actively explore potential guidance, solutions and wider reforms. In the paragraphs to follow, extracts from speeches published on the official webpages of the EU central bank and BIS, specifically referencing monetary policy, intangibles and IPRs are set out and critically discussed.

3.1 Muhammad bin Ibrahim, Deputy Governor of the Central Banks of Malaysia (2014)

In his speech on 24 September 2014, Mr Muhammad bin Ibrahim, Deputy Governor of the Central Bank of Malaysia (Bank Negar Malaysia), stated that:

> *Greater recognition of IP as a relevant factor in financing decisions is a proven concept. Different financial players harness the potential of IP in different ways. The varying business models and risk appetites within the financing ecosystem will determine how IP fits into financing considerations. For example, banks have to prioritise depositors' interests and would not be expected to finance ventures with high risks. However, this is not true in all cases. SMEs with proven track records should be within banks' sights, in such cases the value-add of IP should be more effectively leveraged. Indeed, in other emerging economies, progress has been evident. The Thai SME Bank, Chinese Bank of Communications and the Federal Development Bank of Brazil already take IP into consideration for financing…Therefore, it is an opportune time that the boards and senior management of the financial service fraternity in Malaysia to begin to actively explore pragmatic approaches to assimilate IP into existing financing considerations.*[82]

[82] *Muhammad bin Ibrahim: Issues Surrounding Intellectual Property* (24 September 2014) IP Financing Conference published by BIS at https://www.bis.org/review/r141024f.htm accessed on 13 April 2020.

The Deputy Governor of the Central Bank of Malaysia asserts and acknowledges the important role of the asset class of intangibles, innovation and IPRs for sustainable innovation finance. He recommends that the 'value-add' of IPRs should be more effectively leveraged and that three other important state lenders already take IPRs into consideration when approving finance.

3.2 Mr Mario Drago, President of the European Central Bank (ECB) (2017)

In his 2017 speech entitled, "Fostering Innovation and Entrepreneurship in the Euro area" Mr Drago, ECB President, thoughtfully raised the issue of innovation (which may be patent-protected) and entrepreneurship, linking it to economic productivity growth: [83]

> *This might at first glance seem an unusual topic for a central bank conference, since monetary policy principally operates through the demand side of the economy. But the long-term supply picture evidently also affects our ability to deliver on our mandate. Much of the debate today about the true level of the real equilibrium interest rate, for example, is a debate about the outlook for productivity growth, which of course depends in large part on innovation and entrepreneurship. Higher productivity growth is also vital to safeguard Europe's economic model of high wages and social protection, and hence to counter the sense of economic insecurity that is currently prevalent in several advanced economies.*
>
> *…Consider, for example, the persistent gap between R&D spending in Europe and other major advanced economies. According to the World Economic Forum's Global Competitiveness Indicator, only three Euro area countries are in the world's top ten for innovation. So, if, as the world's second-largest economic area, we were to dismantle barriers to innovative activity in the euro area, it would clearly give a boost to global innovation. I will not go into detail here about what policies this might entail, but clearly government support for innovation matters: in Europe differences in*

[83] *Mario Draghi: Moving to the frontier – promoting the diffusion of innovation* (13 March 2017) Joint ECB and MIT Lab for Innovation, Science and Policy Conference in Frankfurt am Main, Germany at file:///D:/University%20Oslo/Material/Mario%20Drago%20Promoting%20the%20Diffusion%20of%20Innovation.pdf accessed on 14 April 2020, p1

innovative capacity between countries are closely related to public spending on R&D, particularly in basic research. [84]

Mr Drago clearly states that one aim of monetary policy is to 'dismantle the barriers to innovative activity'. Next, he proceeds to address the topic of intangibles and IPRs directly, confirming:

...Numerous studies have shown that firms which invest more in intangibles are in a better position to understand and benefit from new technologies.[85] *Such investment includes conducting their own R&D and developing their own intellectual property, as well as investment in branding, software and databases. Investment in intangibles also appears low in the euro area compared with a number of other advanced economies, although it has been on an upward trend. The aggregate number also masks a wide country-level disparity, with the lack of intangibles investment particularly acute in some countries. Increasing the resources devoted to R&D would improve the ability of euro area firms to absorb more innovation.*[86]

Mr Drago concludes his speech advising that it is a "priority today in the euro area to address weak productivity growth."[87] However, he does not identify capital regulation specifically as a barrier to innovation finance.

3.3 Philip R Lane, European Central Bank (ECB) Executive Board Member (2019)

Mr Philip R Lane, ECB Executive Board member, addressing the "Challenges in the digital age" in a speech delivered to the recent 2019 ECB, supports more attention by central banks on new digital business models, the foundation of which is software, an intangible and largely protected by copyright, an unregistered form of IPR:

A distinctive feature of digital technologies is their reliance on intangible capital. For instance, according to national accounts data, the share of investment devoted to

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[84] Ibid
[85] Supra n[46] p 6, See Coe, D.T., Helpman, E. and A .W. Hoffmaister (1997), Engebrecht (1997), Frantzen (2000) and Griffith, Redding and van Reenen (2004).
[86] Supra n[46], p6.
[87] Supra n[46], p9.

intellectual property has almost doubled over the past two decades. This measure, however, is bound to underestimate the actual importance of intangible capital, since many of its components are not included in the national accounts.[88] *There is some evidence that the weakness of physical capital investment over the past few years, if not longer, can to a large extent be explained by intangibles.*[89] *... Financing is one factor that may hold back R&D in the European digital sector. For instance, intangible investment is difficult to collateralise and therefore harder to finance in a conventional bank-centred financial system like the one prevailing in continental Europe.*

Critical discussion and new insights to drive CAR reform

Mr Lane acknowledges that the conventional bank-centred financial system prevailing in Europe makes intangible investment difficult to collateralise and therefore harder to finance. His statement helpfully puts the financial barrier faced by intangibles as loan security front and centre for central bank policymakers to acknowledge, reflect and contemplate further. This is an important step in the Kubler-Ross cycle of change management.[90] The stages of change management are denial, resistance, exploration and acceptance. This chapter encapsulates stage three, namely exploration. Central banks cannot ignore or fight change, rather they need to actively explore and manage the change affecting the quality of loan security available as it is and not as they wish it to be, i.e. traditional tangible assets.

In the author's view, the extracts from the speeches above demonstrate solid awareness of the financial barriers to innovation finance in an economic sense, a key step that will move central banks to actively explore potential solutions and reforms, but less so on the point of CARs and prudential regulation. The author suggests central banks may be receptive to the argument that there is scope to introduce reforms to ease the negative impact of CAR requirements in respect

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[88] *Philip R Lane: Welcome address - "Challenges in the digital age"*(4 July 2019) ECB conference on "Challenges in the digital age", p1, Frankfurt am Main, Germany at https://www.bis.org/review/r190715g.pdf accessed on 14 April 2020; See also Andersson, Malin and Saiz, Lorena (2018), "Investment in intangible assets in the euro area", Economic Bulletin, Issue 7, ECB, November; and speech by Luis De Guindos (2018), "Investment, technological transformation and skills".

[89] Ibid. See also N. Crouzet and J. Eberly, "Understanding Weak Capital Investment in the Role of Market Concentration and Intangibles" (August 2018) prepared for the Jackson Hole Economic Policy Symposium, Federal Reserve Bank of Kansas, USA.

[90] E. Kubler-Ross, *On Death and Dying* (1969) Scribner Book Company Reprint Edition (12 August 2014). The Kubler-Ross model describes five stages of emotional and psychological response to grief, tragedy and catastrophic loss and in behavourial economics or in the case of the Covid-19 pandemic, is used in a change management context.

of intangible loan security such as registered granted IPRs. Carving out registered granted IPRs from the requirement to be deducted from the bank's capital and treating them more favourably as loan collateral could be the subject of further empirical research to obtain IPR risk data. The Basel Accord IV capital regulation (which has yet to be finalised) could amend section 67 Goodwill and Intangibles to better distinguish the collateral potential between the different types of intangibles. The wider class of intangible assets could be separated into new categories of loan collateral with more appropriate risk weighting for capital regulation purposes. In the author's view this would better reflect commercial reality and the corporate wealth and of its clients. The potential new and additional categories of IP monopoly rights under section 67 are set out below, in order of most legally certain IPR to least legally certain IPR:

Registered granted IP monopoly rights (patents, trade marks, designs)

Registered IP monopoly right applications

Unregistered IP monopoly rights (copyright, database rights, confidential information, unregistered brands/trade marks).

The advantages of registered, granted IPRs

Why is the distinction between registered and unregistered IPRs important in terms of loan security potential and valuation? Like a land title register or a share registry, the advantages of a system of national patent, trade mark and design registers are numerous but in the main relate to transparency of the monopoly granted and ownership. Registered IPRs have to be applied for and fulfil specific legal criteria under relevant national IPR legislation.[91] A central pillar of the modern system of certain IPRs that only come into existence if they are lawfully registered with the national IP office in the 'first to file' registration of title to the IPR. 'First to file' registration system incentivises IPR owners to file the patent, trade mark or design application with the relevant national IP office as soon as is practicable. Once the application and registration process have been completed, a registered owner has the exclusive monopoly right to use the IPR across the UK as IPRs are territorial rights. The sooner the IPR is registered, the sooner the owner can exercise their monopoly right over their territory to exclude others in the market from using the invention, trade mark or design, back-dated to the date of registration. Registration of the title to the IPR results in a register entry being generated and maintained by the respective national IP office, the organisation that centrally holds the details of all IPR

[91] Patents Act 1977 (UK), Trade Marks Act 1994 (UK) and Registered Designs Act 1949 (UK).

ownership in the UK. The information on the register is important as it stakes out the boundaries of the IPR providing a high degree of legal certainty regarding the asset. The relevant IPR registers confirms the person, natural or legal, who owns the stated monopoly IP rights and provides detailed information concerning the scope and boundary of those intangible IPRs. Third party interests in the IPR can be recorded in the register. Additionally, the online IPR register can be searched by owner, registration number or key word very easily.

Pioneering advances in the use of online IPR registers and databases

In the UK and the EU, the patent, trade mark or design register is public information, and at this time in the history of modern IPRs, freely electronically accessible and searchable, providing a clearer picture of the legal state of the IPR and the scope of the monopoly afforded by the registered right. Indeed, the online electronic register is a key development that arguably makes registered IPRs more attractive as loan security than in the past. The impact of online patent information databases has been a milestone for the global patent system and for innovation.

If registered IPRs are to be viewed more favourably from a banking capital risk perspective the challenge of transparency of registered IPR ownership arises and raises the question of the role of IP institutions such as WIPO, the EPO and national IP offices. For example, Gorbatyuk asserts that the level of transparency be increased by mandating changes in title of patent ownership throughout the lifetime of a patent be recorded at national patent offices. Further, she proposes strict measures for non-compliance. In addition, it is argued that it would be beneficial if the EPO would register patent transfers of title during the lifetime of patents issued through the EPC system, beyond the opposition period.[92] Thus introducing a mandatory requirement to register sequential patent ownership (chain of title) would increase the level of transparency and legal certainty for third parties such as banks and more closely align with the system of registration of immoveable and moveable tangibles such land title, car registration and the like.

In the next section we analyse how the IPR legal framework has evolved to create a higher level of legal certainty as to the scope of the monopoly using patents as our example as most

[92] A. Gorbatyuk, Rethinking Registration of Intellectual Property: The Issue of 9the Lack of) Transparency of Intellectual Property OwnershipIn: *Rethinking IT and IP Law. Celebrating 30 Years CiTiP* (2019) Intersentia pp. 235 - 242

relevant to UN 2030 SDG 9. We consider patent revocation proceedings, the timeframe between patent application and grant of the monopoly right, the UK's Green Channel to expedite inventions that involve the environment and how these modern developments enhance the loan security potential of registered IPRs.

The EUIPO's pioneering Esp@cenet database integrates online patent information on a common platform on the Internet and is now over 20 years old, having launched on 19 October 1998. The Esp@ database substantially enhances the patent examination process in the UK and EU member states by ensuring only high quality inventions, absolutely novel anywhere in the world, are granted monopoly rights in this jurisdiction.[93] Further, many national patent offices around the world, work together to improve the overall quality of granted patents, through various mechanisms related to prior art search and examination work[94] Examiners from different patent offices with complementary skills work together on the corresponding patent applications filed with those patent offices, resulting in higher quality examination.[95] The existence of comprehensive, freely available online patent searching is a relatively new modernising factor that accentuates the attributes of registered IPRs as better suited for use as loan security than before. As noted above, the legal chain of tile and transparency risks involved in searching for competing interests in registered IPRs are rooted in registers of title and secured transaction law which can be improved and are not an inherent function of the usefulness, monopoly advantage or economic value of the inventions protected by the patents. In contrast, various unregistered IPRs also exist, the most well-known is copyright which comes into existence on creation, on fulfilling specific legal criteria under relevant national copyright legislation.[96] Registered and unregistered trade mark and design rights provide overlapping legal protection.

Granted IPRs and the presumption of validity: a relatively low risk of patent revocation

[93] Esp@cenet: 20 years of free access to patent information in Europe (19 October 2018) *The Patent Lawyer Magazine*, at https://patentlawyermagazine.com/espacenet-20-years-of-free-access-to-patent-information-in-europe/, accessed on 8 June 2020. Esp@cenet contains 100 million documents from over 100 countries, the single largest sources of technical information available.

[94] International Worksharing and Collaborative Activities for Search and Examination of Patent Applications (WIPO) available at https://www.wipo.int/patents/en/topics/worksharing/ accessed on 11 June 2020.

[95] Ibid

[96] Copyright Designs and Patents Act 1988 (UK)

The advantage of registered IP rights as loan security is that they are presumed to be legally valid unless revoked.[97] For example, in the UK granted patents are presumed valid, although this presumption is rebuttable with clear and convincing evidence. Section 72(1) Patents Act 1997 (UK) provides the Court or Comptroller with the authority to revoke patents only on very specific grounds, namely:

> (a) the invention is not a patentable invention;
>
> (b) that the patent was granted to a person who was not entitled to be granted that patent;
>
> (c) the specification of the patent does not disclose the invention clearly enough and completely enough for it to be performed by a person skilled in the art;
>
> (d) the matter disclosed in the specification of the patent extends beyond that disclosed in the application for the patent, as filed, or, if the patent was granted on a new application filed under section 8(3), 12 or 37(4) above or as mentioned in section 15(9) above, in the earlier application, as filed;
>
> (e) the protection conferred by the patent has been extended by an amendment which should not have been allowed.

According to the UKIPO *Manual of Patent Practice*, revocation has effect *ex tunc* and the patent is therefore deemed never to have been granted.[98] The effect of patent revocation is to deprive the patent owner of their monopoly right of exclusivity. While this might sound catastrophic in terms of loan security, the Court of Justice of the EU (CJEU) has ruled in *Genentech Inc v Hoechst GmbH, Sanofi-Aventis Deutschland GmbH* (Case 567/14) that EU competition law does not preclude patent licence agreements from including terms requiring the licensee to continue to pay royalties even after those patents have been revoked, so long as those agreements permit the licenses "freely to terminate that agreement by giving reasonable

[97] C. Heer and K. Wei, 'The Differences between Unregistered and Registered Trademarks in Canada' (6 October 2019) at https://www.heerlaw.com/differences-unregistered-registered-trademarks accessed on 14 April 2020.

[98] Sections 72.01 - 72.45 *Manual of Patent Practice* (last updated: April 2018) UK Intellectual Property Office available at https://www.gov.uk/guidance/manual-of-patent-practice-mopp/section-72-power-to-revoke-patents-on-application, accessed on 8 June 2020.

notice".[99] Further the CJEU held that in this case, the royalty, even after patent expiry, could be considered to reflect a commercial assessment of the value attributed to the exploitation possibilities granted by the licence. The CJEU relied on its earlier decision in *Ottung* (Case 320/87)[100] whereby it held that requiring a licensee to pay a royalty, even if the term of the patent had expired, may reflect a commercial assessment of the value of exploitation resulting from the licence.[101] [102] Thus, from a cash flow and therefore a lender's banking risk point of view, in the EU royalties could continue to be payable under a licence even after the licensed patent has been revoked, provided that the licensee is free to terminate the licence on reasonable notice. The reasonable notice period could trigger risk mitigation action on the part of the borrower and lender. For example, each month the UK *Patent Journal*[103] reports all UK and European patents that have become void (s77(7) Patents Act 1977), revoked (under Article 102 of the European Patent Convention); ceased (through non-payment of renewal fees); or expired (after the termination of 20 years).[104] As part of the literature search for this exploratory study, the author unsuccessfully searched for empirical data regarding the rate or percentage of revoked patents per annum in the UK and EU to inform the analysis, however, she was unable to locate such information. This suggests the number of patents revoked every year is quite low as it has not warranted significant interest to date. Of interest however, is a study of UK patent litigation commissioned by the UKIPO that identified 541 patent cases in the period between 2007 and 2013 or an average of around 77 cases per year.[105] This study gives a snapshot of the volume of UK patent litigation that could result in a granted patent being revoked. When compared to number of patents granted each year, the commercial risk in terms of deterioration

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[99] Royalties for Revoked Patents do no Necessary Breach EU Competition Rules (9 September 2016) Pennington Manches Cooper LLP, available at ttps://www.penningtonslaw.com/news-publications/latest-news/2016/royalties-for-revoked-patents-do-not-necessarily-breach-eu-competition-rules, accessed on 8 June 2020.

[100]Judgment of the Court (Sixth Chamber) of 12 May 1989 in *Kai Ottung* v *Klee & Weilbach A/S* and Thomas Schmidt A/S Case 320/87. Reference for a preliminary ruling: *Sø- og Handelsretten*, Denmark. Licensing agreement - Patent - Royalty and termination clause - Article 85 of the EEC Treaty. *European Court Reports 1989 -01177*, ECLI identifier: ECLI:EU:C:1989:195

[101] Ibid

[102] In contrast, note the US Supreme Court's decision in *Kimble v Marvel* [2015] which determined that the contractual obligation to pay royalties beyond the term of a patent was not enforceable, a decision that contrasts with the *Ottung* case.

[103] See https://www.ipo.gov.uk/pro-types/pro-patent/pro-p-os/pro-p-journal/p-pj-download.htm accessed on 8 June 2020. The National Archive holds the *Patent Journals* from 12 August 1988-26 March 2008. The UKIPO also publishes the *Trade Marks Journal* and the *Design Journal* with respect to those registered IPRs.

[104] See the UK IPO instructions for patent searches at https://www.ipo.gov.uk/patent/p-journal/p-pj/p-pj-epuk/p-pj-epj-epuk-help.htm, accessed on 8 June 2020.

[105] Helmers et al., "Examining patent cases at the Patents Court and the Intellectual Property Enterprise Court 2007‑2013" (2015) UK Intellectual Property Office

or extinction of loan security is normally quite low. It is submitted that the volume of patent revocations per annum is smaller than the number of patents subject to litigation. However, such patent litigation may implicate commercially valuable patents. Patent litigation in the UK's High Court is dominated by large firms involved in the pharmaceutical, high tech and telecoms fields[106]. Arguably, large well-established firms are more likely to be able to provide alternative security in the event of patent revocation. There is scope for further research on this point to provide empirical evidence of the relative legal certainty afforded granted patents in a loan security and prudential banking regulation context. Similar arguments also apply to other registered IPRs.

Subsistence: unregistered IPRs offer less legal certainty

There are no unregistered patent rights. Unregistered trademark, design rights, copyright and trade secrets must be proven in a court of law which is costly and time-consuming. For example, the owner of an unregistered trademark must provide that there is goodwill or reputation attached to the unregistered mark. A person must be able to prove at common law that they were the first creator and owner of an unregistered design right, as there is no confirming registration to presume ownership of the design right. The above provides a clear rationale for the superior loan security potential of registered IPRs (in contrast to goodwill, other intangibles and unregistered IPRs) in a similar vein to systems for registered land, vehicle and shares, for example.

As we are interested in suggesting rational reforms for prudential banking regulation, the first step in unbundling the wider asset class of intangibles is to create a subset of registered IPRs which could be treated more favourably for CAR purposes. Although patent, trade mark and design applications also have value, it is submitted that the value of IP applications is significantly less legally certain than granted monopoly rights until challenged, and thus less attractive for security and banking capital regulation purposes. Yet even so, IP-backed finance has made loans against unregistered rights with proven income streams that generate cash flow to service loan repayments and should not be excluded from the solutions proposed as many jurisdiction have active copyright registers.

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[106] 'Part two of a six part series reviewing the patent litigation landscape in Europe- Patent Litigation in the United Kingdom' (11 April 2018) Simmons & Simmons, available at https://www.simmons-simmons.com/en/publications/ck0d8d8qwmlgz0b593vor6rjp/080218-how-much-patent-litigation-is-there-in-europe-uk accessed on 8 June 2020

The shorter timeframe between application and grant of the IP monopoly

Another factor is the time timeframe between the date of the patent application through to grant of patent monopoly rights. This process usually takes no more than four years, but may be much less if the patent application comprises a 'green' invention eligible for expedited examination on the UKIPO's Green Channel for patents with environmental benefits.[107] If a green invention is being applied for, the time to grant could be reduced to as little as 18 months, especially if the invention is not complex. Further, the 'Patent Prosecution Highway' initiative significantly accelerates the patent application process if the patent has already been examined at another intellectual property office.[108] UK trade mark applications take even less time to be processed and typically take only approximately 4-6 months if the application is unopposed by any other registered trade mark owner with an additional 6 months if opposition proceedings are involved. A similar time frame applies to design registration process. In terms of volume, the EU Intellectual Property Office (EUIPO) states that is registers almost 85,000 designs per year.[109] Given the fact that the time frame to register IP rights has improved over the last decade due to online processing, searching and examination discussed above, in the author's opinion there is less urgency for treating unregistered IP rights differently to intangibles generally for CAR and prudential regulation. As the level of legal certainty is likely higher for registered, granted IPRs we must balance this with the goal of prudential regulation in providing a capital buffer for banks. In other words, from a prudential banking standpoint, the additional legal certainty provided by registration and grant of a 20 year monopoly option, in my view, are the rationale for carving out this type of IPR intangible from the wider class of intangibles on the basis of the differentiating characteristics that give rise to higher quality as security (collateral) than earlier, now expired patents, granted pre-1998. Forward-looking studies, scenario analyses and stress tests could be performed as part of a UK Bank of England / ECB pilot initiative. In the next section, we turn to the views of a member of the Bank of England Monetary Policy Committee on the implications of increased investment in the intangible economy.

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[107] The UKIPO introduced the fee-free Green Channel for patent applications on 12 May 2009. This service allows patent applicants to request accelerated processing of their application if the invention has an environmental benefit, see https://www.gov.uk/guidance/patents-accelerated-processing accessed on 8 June 2020.

[108] Ibid

[109] See https://euipo.europa.eu/ohimportal/en/designs, accessed on 8 June 2020.

3.4 Professor Jonathan Haskel, External Member of the Bank of England Monetary Policy Committee (2020)

Professor Jonathan Haskel,[110] External Member of the Bank of England Monetary Policy Committee, gave a speech at the University of Nottingham on 11 February 2020 entitled, "Monetary Policy in the Intangible Economy"[111] published by the Bank of England. Haskel focused on the implications of the movement to an economy with more intangible investment, for both the short-run transmission mechanisms and the long-run natural rate.[112] He referred to the Bean et al (2002) study which describes the "bank lending" channel and the "broad credit" channel.[113] The essential feature of the former bank lending channel is that monetary policy affects bank balance sheets which in turn affects their appetite for lending.[114] The broad credit channel focuses on information frictions between borrowers and lenders, and how the mechanisms created to overcome these frictions can lead to amplification of financial shocks.[115]

In his speech, Haskel considers how these additional channels affect a more intangible-based economy. Haskel also confirms that intangible capital is less easy to pledge as collateral with creditors and young intangible firms may be more likely to have little or no earnings, which may result in an intangible economy that becomes disconnected from debt markets and (traditional) banks.[116] Haskel states, '…the move to an intangible economy, without financial innovation, may raise borrowing costs and give rise to less borrowing and more internal funding' for IPR-rich borrowers with little tangible collateral such as land, buildings, equipment or vehicles.[117] Haskel advised there is evidence that intangibles may indeed interact with collateral constraints, so that with more intangibles in the economy there is heightened sensitivity of firms to monetary policy.[118] Delving deeper into this barrier to sustainable

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[110] Jonathan Haskel CBE and Professor of Economics, London Imperial College London and author of J. Haskel, and S. Westlake, *Capitalism without Capital: the Rise of the Intangible Economy* (2017) Princeton University Press. Haskel became a member of the Bank of England's Monetary Policy Committee (MPC) in May 2018.
[111] Speech published by the Bank of England at https://www.bankofengland.co.uk/-/media/boe/files/speech/2020/monetary-policy-in-the-intangible-economy.pdf?la=en&hash=355DD0667ABC60E2BDEE465E05448E863D57CE54 accessed on 14 February 2020.
[112] Ibid p 3.
[113] C. Bean, J. Larsen, and K. Nikolov, Financial Frictions and the Monetary Transmission Mechanism: Theory, Evidence and Policy Implications. In: *Monetary Policy Transmission in the Euro Area*. Edited by I. Angeloni, A. K. Kashyap and B. Mojon. Cambridge University Press, 2003, pp. 107–130
[114] Supra n [56] p 4
[115] Supra n [56] p 4
[116] Supra n [56] p 4
[117] Supra n [56] p 8
[118] Supra n [56] p 10

innovation finance, Haskel opines that the shift to intangibles might affect the monetary transmission mechanisms if intangibles are harder to borrow against and so firms seeking external finance find it harder to do so. He concludes that the conventional financial system finds it hard to value and so lend against intangible assets, then over the long-run risk spreads will rise as the economy becomes more intangible-based.[119] Haskel highlights that innovation and IP-rich borrowers may be credit constrained or even excluded from credit markets. This situation creates inequalities between borrowers and lenders (and among borrowers) with the starting point that if green innovation firms are credit-excluded, they cannot borrow, and they receive no income at all their innovations will never benefit the public or solve the climate change or Covid-19 problems facing the planet. The exiting credit market, guided by compliance with Basel drive monetary policy and CAR treatment of the class of intangibles, perpetuates inequalities and the outdated perception of the security value of registered IPRs. The above extracts from high level speeches by professionals involved in monetary policy in Central Banks demonstrate a growing awareness by central banks that they have a role to play in shaping access to sustainable finance, innovation and economic productivity. Since Basel III, the BCBS has been reviewing risk-measurement approaches internationally and among banks.[120] In an interview with the *Financial Times,* Valdis Drombrovskis referred to a proposal that would encourage banks to finance green investments including energy-efficient homes and zero-emissions transport by lowering capital requirements.[121] It is positive that two important central banks are actively and expressly supporting engagement with innovation, intangibles and IPRs (namely patent that provide monopoly protection for qualifying new innovations) as potential solutions to economic global productivity problems. Since 2019, under Basel III a bank's Tier 1 and Tier 2 capital must be a minimum of 8% of its risk-weighted holdings. The higher ratio provides a stronger buffer than the 2% ratio in place over a decade ago in 2008 and has greatly improved global banking financial stability.[122] The Group of Central Bank Governors and Heads of Supervision (GHOS) has indicated that it does not intend to increase the total regulatory capital requirements in the

[119] Supra n [56] p 10
[120] S. Koch, 'Banking Regulation' (22 November 2017) *The Economic Times*
[121] Brussels eyes easing bank rules to spur green lending (2019) *The Financial Times* at https://www.ft.com/content/bddc3850-1054-11ea-a7e6-62bf4f9e548a accessed on 15 April 2020
[122] S Nikolas, 'What is the minimum banking capital adequacy ratio under Basel III' (21 July 2019) available at https://www.investopedia.com/ask/answers/062515/what-minimum-capital-adequacy-ratio-must-be-attained-under-basel-iii.asp, accessed on 13 April 202o

industry as a whole.[2] Indeed, prior to the Covid-19 pandemic there was some discussion about potentially relaxing the CARs.

4 State of flux due to climate change and developments to support green finance

On 12 November 2019, the keynote speech of Vice President Valdis Dombrovskis referenced the challenges and impacts of implementing Basel III.[123] European Commissioner for Financial Stability, Financial Services and the Capital Markets, Valdis Dombrovskis has initiated discussions regarding potentially easing bank capital rules to facilitate green finance.[124] Dombrovskis stated that the proposal would encourage banks to finance green investments by lowering capital requirements, the CAR that measures a bank's ability to absorb losses.[125] However, details are still lacking as to what the Group of Central Bank Governors and Heads of Supervision (GHOS) might do to improve the IPRs as loan security situation. The case for carving out registered IPRs such as granted patents, trade marks and designs from the intangibles asset class (nonphysical assets with potential benefit in the long term) has been outlined in this chapter. Further, the international IPR system is sanctioned by the World Trade Organization (WTO)[126] and administered by the World Intellectual Property Organization (WIPO).[127] The WTO's Agreement on *Trade-Related Aspects of intellectual Property Rights (TRIPS)*[128] was negotiated over two decades ago during the 1986-94 Uruguay Rounds, introducing IPR rules into the multilateral trading system. TRIPS is legal recognition of the significance of links between intellectual property and trade. The WTO states that the new internationally agreed trade rules for IPRS were seen as a way to introduce more order and predictability.[129] Functional IPR legal frameworks are mandated for all WTO member states. The lack of GHOs attention to the global IPR system suggests a level of dissonance and lack of coherence as between the finance and IPR law disciplines that needs to be rectified. Central banks should be encouraged to re-evaluate the security potential of

[123] See https://ec.europa.eu/commission/presscorner/detail/en/SPEECH_19_6269 accessed on 12 November 2019
[124] B Caplan, 'The risks of getting green finance wrong' (3 December 2019) The Banker, The Financial Times Ltd.
[125] Corporate Finance Institute at https://corporatefinanceinstitute.com/resources/knowledge/finance/capital-adequacy-ratio-car/ accessed on 7 January 2020.
[126] See www.wto.org and the WTO Text at https://www.wto.org/english/docs_e/legal_e/legal_e.htm#TRIPs
[127] See www.wipo.org
[128] See https://www.wto.org/english/thewto_e/whatis_e/tif_e/agrm7_e.htm
[129] 'Intellectual Property: Protection and Enforcement' at https://www.wto.org/english/thewto_e/whatis_e/tif_e/agrm7_e.htm

modern registered IPRs such as granted patents and consider the interaction between the hitherto independent legal ecosystems.

My hypothesis suggests that the potential of registered IPRs as loan security is underestimated when compared to the wider class of intangibles generally (a class that includes substantially more nebulous intangibles such as goodwill, know-how and unregistered IP rights e.g. copyright, confidential information and trade secrets). Further, in the financial sector specialist IP finance lenders already exist and are successful. In the UK these are authorized by the Financial Conduct Authority. There is potential the central banks to study these specialist lenders experience vis-à-vis prudential regulation requirements. The first cross-country study on how financial crises affect patenting shows the lack of access to bank credit will result in firms dropping both ongoing (sunk costs) and new R&D projects. Hardy and Severs find that:

> *…these industries decrease their patenting more following a financial crisis than other industries. The effect is persistent, lasting upwards of 10 years, and is specific to banking crises. This indicates that when firms lose access to bank credit, they may be forced to drop new and ongoing R&D projects. This results in fewer patents over the following years. These results provide a link between financial crises and the sustained decline in output and productivity observed after a recession.*[130]

Losing R&D projects that may lead to innovation to support global sustainability in the public interest, makes it less likely that UN 2030 SDG 9 will be achieved. Banking capital adequacy ratios is one aspect of the 'financial channel to innovation' which this chapter has addressed advocating a more contemporary approach to the categorization of intangibles would support UN 2030 SDG 9. Next, we consider how climate change is adversely affecting value certainty in the housing market and may provide further incentive for central banks to consider levelling the playing field for IPRs as loan security.

4.1 Tangible assets: value uncertainty challenges due to climate change

[130] B. Hardy and C. Sever, *Financial Crises and Innovation* (4 March 2020) BIS Working Paper No.846 https://www.bis.org/publ/work846.htm accessed on 14 April 2020

We have seen that the main actors in the financial system are commercial banks (banks), the central bank, pension funds and other financial institutions. Patents and other forms of IPRs are personal property rights that can be traded independently of the protected technology. For example, non-practising entities (NPEs) who acquire patents, also use their patent portfolio as loan security. Asset markets are the money market, the stock market, the housing market and the other financial markets. There is currently no functioning IPR or patent market, although as mentioned earlier there are many purchasers and today patent intermediaries exist and patent auctions increasingly take place.[131] Non-practising entities (NPEs) who acquire patents, are also able to use their patent portfolio as loan security. The housing market, however, plays an important role in the economy and houses are the main form of wealth of households (except for the very rich). Company directors of IPR rich firms often have to rely more on personal tangible assets (as opposed to company assets) to overcome lending frictions by giving lenders a security interest (a director's guarantee) in their homes. Houses and the land they sit on are traditional loan security, but this type of fixed tangible security is facing new challenges. Dr Rhian-Marie Thomas, OBE and Chief Executive of the UK's Green Finance Institute argues that within the context of 20-or 30 year mortgages (secured by buildings and homes), these timescales are beyond the planning horizons of banks and building societies due to a variety of risks including climate change and flooding.[132] In a speech dated 8 November 2019 she stated:

> *About 12% of land in England is adjacent to a river or a stream and these low-lying areas are more vulnerable to floods…As these flood risks become more prevalent due to climate change…these physical risks in the real economy clearly also pose a considerable risk to the financial sector. That is why 50 of the world's central banks, including the Bank of England, have formed the rapidly growing Network for Greening the Financial System. They recognize that climate change represents the single greatest systemic risk to the stability of financial services and they are working together to explore and share best practice to mitigate the risk using all the*

[131] L. Tonnison, R. Millien and L. Maicher, 'Shortcoming on the Market for Intellectual Property: Qualitative study among intellectual property service providers on various problems related to intellectual property markets (March 2016) Fraunhofer Center for International Management and Knowledge Economy, available at https://www.imw.fraunhofer.de/content/dam/moez/de/documents/Working_Paper/Working-Paper_Shortcomings%20on%20the%20market%20for%20intellectual%20property.pdf accessed on 14 April 2020.

[132] Speech: Dr Rhian-Mari Thomas OBE, chief executive, Green Finance Institute on the impact of climate change on the mortgage market (November 2019) UK Annual Mortgage Conference.

> *supervisory and regulatory levers at their disposal to drive change- governance, capital adequacy and weighting, stress testing, disclosures, data provisions and so on.*[133]

Essentially, banks lack the ability to measure exposure to climate risk (echoing their claim of inability to value patents). Professor Nigel Wright,[134] a flood risk expert, in online exchange in September-November 2020 with the author, agrees that there may be an adverse impact on land and property values due to climate change in the future. Wright's research spans the use of computers to predict the movement of fluids in the natural and built environment expanding into cross-disciplinary aspects of flood risk management and climate change adaptation. Further, Wright suggests that climate change will create risks other than flooding which may also impact on asset value in the housing market. He counsels that there is insufficient data available to assess the likely impact on lender's security value at present. Wright advises that lenders could insist on additional measures to make properties more resilient to flooding to mitigate risk. Wright concurs with Dr Thomas that additional research on the subject of lender's exposure to flood risk is vital, as some research suggests that existing desirable and expensive property e.g. on the Thames to the West of London for example, would not be adversely affected.[135] Brassell and Kings' research in their *Banking and IP* Report confirmed that "recent banking initiatives targeting growth businesses are finding that traditional fixed assets simply no longer exist".[136] If level of credit risk related to traditional tangible bank assets such as residential mortgages and real property is increasing, necessitating a reassessment of the CAR weighting, what does the future hold for loan

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[133] Ibid

[134] Professor Nigel Wright is Deputy Vice-Chancellor for Research and Innovation at Nottingham Trent University, a Chartered Engineer and Fellow of the Institution of Civil Engineers. See N. Wright, 'Advances in flood modelling helping to reduce flood risk' (2014) *Proceedings of the Institution of Civil Engineers-Civil Engineering*, 167 (2), p. 52; and N. Wright et al, 'Delivering and evaluating the multiple flood risk benefits in blue-green cities: an interdisciplinary approach' In: D. Proverbs and C.A. Brebbia eds., *Flood recovery, innovation and response IV* (2014) WIT Press, Southampton, pp. 131-124.

[135] J. Lamond, D. Proverbs and F. Hammond, 'The Impact of Flooding on the Price of Residential Property: A Transactional Analysis of the UK Market' (2010) *Housing Studies*, Vol. 25, Issue 3, pp335-356

[136] *Banking and IP?* Report (2013) p13

security and capital regulation? Will the reduction in stock and quality of traditional residential loan security lead lenders to adopt a more risk-tolerant approach to monopolistic registered IPRs? In this chapter, I have laid out several arguments as to why registered granted IPRs could play a more important role in the credit market and sustainable innovation finance. Given the likely increased value uncertainty facing the mortgage market due to climate change, treating registered IPRs more favourably in terms of banking CARs and risk weighting could potentially strengthen a country's ability to unlock and commercialise new inventions to tackle global challenges. Statutory granted IP monopoly rights such as patents, trade marks and designs provide unique commercial advantages as loan security that may not currently be recognized by the central bank regulators.

4.2 Elaborating the case to treat registered IPR more favourably for CAR purposes

UN Sustainable Develop Goal 9 concerns innovation and technological progress. Inventions are state-sanctioned time-limited monopolies that provide the patent owner the important negative right to stop others using the invention without permission for up to 20 years as long as renewal fees are paid.[137] The links between innovation and sustainability are proven. Research confirms that IP-rich businesses are more sustainable in the long term and that there is a positive association between patenting and firm outcomes, in that they benefit from time-limited monopoly advantage of patents.[138] Further, patenting is positively associated with future business growth and survival in the long term, and if firm is unsuccessful, patents provide salvage value[139] for lenders. An important component of sustainability is sustainable finance which refers to finance that takes into account environmental, social and governance considerations leading to increased investment in longer-term and sustainable activities.[140] Thus, a discussion of the role of IPRs to support green finance (climate change mitigation and

[137] Patents Act 1977 (UK)

[138] B. Hall 'Is there a role for patents in the financing of new innovative firms?' (May 2018) Max Planck Institution for Innovation and Competition Research Paper No 18-06; B Hall 'Is There a Role for Patents in the Financing of New Innovative Firms?' (May 2018) Max Planck Institution for Innovation and Competition Research Paper No 18-06

[139] Ibid.

[140] The European Commission Report, *Sustainable Finance* see https://ec.europa.eu/info/business-economy-euro/banking-and-finance/sustainable-finance_en accessed on 18 June 2020.

adaptation and related risks) and blue finance (to support ocean resilience) is highly relevant to both SDG 9 and sustainable finance initiatives.

This section sets out arguments for potential reform to the categorisation of Basel III Tier 1 capital to stimulate lending and cash flow to IP-rich businesses. Prioritising lending to firms with registered, granted IPR assets could be an important component of sustainable blue and green finance. Like the labour market, the credit market is essential to the functioning of a capitalist economy. [141] Money is at the centre of the loan transactions and in simple terms, money is a 'store of value' as, for example, a firm's patented inventions, part of its net worth or corporate wealth. With loan funds, an innovating firm can invest the borrowed money and turn its' innovations and inventions into goods and services that support sustainability in the public interest. Thus, borrowing and lending are about shifting capital as the technological innovations mature, are commercialized and produce income streams (the security/collateral), so long as the market desires the products and services. The venture capital and equity market has evinced a clear interest in funding the R&D and patent applications that may lead to registered patented inventions to combat climate change. Within the debt finance market, borrowing funds at commercially attractive rates enables a firm to further develop its R&D, innovations and inventions in-house and greatly reduces the risk of novelty-destroying disclosures that would prevent the grant of a patent monopoly[142] (plus future royalty income streams available as security).

Nonetheless, lenders – the debt financiers - are right to be wary. To date, lending funds to an IP-rich firm with a high ratio of intangible assets has mostly been viewed as a higher risk loan (with an interest rate calculated accordingly) than lending against traditional collateral such as real property, especially buildings and land. Experts, such as Brian Caplen, editor of *The Banker*, holds the view that relaxing CARs for green loans which are subsequently rolled up into securitizations and given AAA ratings would eventually crash resulting in a regulatory

[141] Economy, Society and Public Policy (2019) CORE Economics Education, Oxford University Press, p 388.

[142] See 'Rising Intangible Capital, Shrinking Debt Capacity, and the US Corporate Savings Glut' Antonio Falato Federal Reserve Board, Dalida Kadyrzhanova University of Maryland, Jae W. Sim Federal Reserve Board November 2012. Finance and Economics Discussion Series Divisions of Research & Statistics and Monetary Affairs Federal Reserve Board, Washington, D.C. file:///E:/University%20Oslo/Material/Rising%20Intangible%20Capital%20Shrinking%20Debt%20Capacity.pdf accessed on 11 January 2020.

response to clamp down hard on green lending.[143] In response to this hypothetical argument, the purpose of capital regulation is to result in both higher and better quality capital. This chapter has put forward that registered granted patents and other registered IPR are better quality capital than traditionally perceived for the reasons elaborated above.

One class for intangible assets may no longer suit all IPRs

Arguably as at 2020, certain tangible property such as house and land as loan security is a riskier proposition than in the past, whilst registered granted IPRs are less so given the modern IPR legal framework. It is true IPRs can be high risk and not all IPRs are valuable in a monetary sense. IPRs may have no financial or monetary value to a lender unless they assist to create, maintain or increase cash flow to service a loan and they are less liquid. However, the class of intangibles is very broad, as is the class of IPRs, both registered and unregistered, yet they are all treated the same by CAR regulation with respect to Basel II Section 67 Goodwill and Other Intangibles discussed in section 2.2 above. Is this bank asset classification current and appropriate for the 21st century given the myriad of technological advances and support IPRs and likewise, that IPRs protect? IPRs as assets, may alter in value for many reasons, but that is also the case for other traditional loan security assets as seen in section 2.3 above with respect to bank assets and elastic risk-weightings. While a patented invention for a new drug, for example, may begin its life as a unique solution to a problem, in time other pharmaceutical companies may find alternative solutions which reduce the patent's royalty income. On the other hand, successful promotion of the patented drug can ensure the patent remains valuable until it expires at the end of a twenty-year term and much longer. Most registered trade marks gain value as they become better known and the licensing of the marks for use by third parties generate revenue to service a loan.[144] There is often positive valuation elasticity as the patented invention is commercialized, which reduces lender risk.

Advances in IPR valuation methodologies

It is only in the last few decades that the concept of 'patent value' has emerged. Now several well-established valuation methodologies for IPRs exist. The cost method and the market value method are based on past performance. In contrast, the income or economic benefit

[143] B Caplen,'The Risk of Getting Green Finance Wrong; (3 December 2019) *The Banker* 'https://www.thebanker.com/Editor-s-Blog/The-risks-of-getting-green-finance-wrong accessed on 3 December 2019.

[144] 'Guidance: Valuing your IP' (12 February 2016) UK Government, see https://www.gov.uk/guidance/valuing-your-intellectual-property accessed on 13 April 2020.

method and the relief from royalty method are based on the lender's assessment of likely future events. Each has its limitations and no one method is appropriate for every type of IPR. With respect to patents, the stage of technological development (or technology readiness level (TRL)), the availability of patent and strategic business information and purpose of the valuation will affect the final monetary value assigned. The UKIPO has published a transaction IPR valuation checklist scored on a scale of 0-5 (0 = no value, 2-3 = weak 4 = strong and 5 = very strong). When patents are valid, even if the borrower defaults, the granted patent portfolio will likely provide lenders with salvage value. A bespoke standardized valuation system could be developed for prudential banking risk and loan security purposes.[145] If the IPRs are rated as strong or very strong, they could be treated more favourably as a form of loan security, without the requirement to be deducted in the calculation of Common Equity Tier 1 capital, for example. The BSBC might consider developing its own bespoke bank asset credit risk valuation methodology/analytics for IPRs as part of any revised capital regulation rules.

Aligning the IP-rich borrower and lender's interests

However, apart from valuing IPR, lenders face two further problems. These are not CAR problems. Rather the material below provides additional background to the IP finance lending landscape and wider concerns vis-a-vis IP-backed lending. First, banks suggest that when loans are taken out for investment in commercializing innovations and inventions, they cannot be sure that a borrower will exert enough effort to make the project succeed. A secured loan reduces the bank's risk as long as the security (e.g. the house, painting, jewelry, land, patents, trade marks and designs) can readily be sold for more than the amount of money owed, the lender is secure. The borrower, by providing security, reduces the conflict of interest between the borrower and the lender because the borrower will tend towards prudent business decisions to ensure commercialization of the invention is a success. In addition to the arguments in section 3.3 above, the author argues that investment in filing and registering patents via a lengthy 1-4 year high level patent examination procedure – means the borrower is investing funds and resources into the venture, therefore their interest aligns with that of the lender. Registered IPRs, such as granted patents (in addition to the higher level of legal certainty than patent applications or unregistered rights) are a good signal to the

[145] Ibid

lender that the borrower believes that the invention is of adequate quality to succeed in the market or have a role within the company's IP portfolio.[146]

As we know, financing early-stage innovation (e.g. R&D, confidential information, trade secrets, pre-patent application) is usually regarded by the market as a high risk investment so that equity finance is common. Once an exclusive patent monopoly has been granted, the lender's risk is reduced to the commercialization of the invention. This is stage of commercialization and technology readiness level (TRL) is not without risk (typically TRL 4-9), it is arguably a significantly lesser risk than the risk level assigned to early stage, pre-patent application, intangible confidential information and know how (TRL 1-3). The use of TRLs enables consistent, uniform discussions of technical maturity across different types of technology and could feature in banking prudential regulation credit risk weightings.[147] The TRL system is already widely used in the public finance domain.

Second, the borrower (the innovation firm) has more inside information than the lender about the quality of the inventions and the likelihood of successful commercialization. These problems arise from a difference (or conflict) of interest between the borrower and the lender, and from the difference between the information the borrower and the lender have about the borrower's project and actions. The problems impose costs of monitoring and loan enforcement that will increase the interest rate on the IPR-secured loan. If the borrower fails to repay the loan, with IPR as security the lender has to assume ownership of the patents, maintain them and find a buyer. It is easier to sell registered granted patents, than unregistered IP rights. Although an important issue for Tier 1 banking capital classification is that there is no organized market for patents, as exists for other types of intangibles such as shares in companies (e.g. the London Stock Exchange, the NASDAQ etc.),[148] this clearly does not mean there are no buyers for the patents. Management buyouts, competitors and patent aggregating firms are all potential patent portfolio acquirers in the modern marketplace, there are also private patent auctions as with antiques and other moveable valuables. Private banks could even set up their own IPR market to liquidate granted patents.

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[146] Supra n[138]

[147] Supra n[23] at p 43

[148] L. Tonnison, R. Millien and L. Maicher, 'Shortcoming on the Market for Intellectual Property: Qualitative study among intellectual property service providers on various problems related to intellectual property markets (March 2016) Fraunhofer Center for International Management and Knowledge Economy, available at https://www.imw.fraunhofer.de/content/dam/moez/de/documents/Working_Paper/Working-Paper_Shortcomings%20on%20the%20market%20for%20intellectual%20property.pdf accessed on 14 April 2020.

A long-history of IPR-backed debt finance

It is important to bear in mind that IPRs have a long history of being used as security for debt. IPRs are currently, increasingly being used to secured loans in many developed countries.[149] The proposal to revise the CAR for registered IPRs aims to enhance access to IP debt finance by innovation firms and make this category of intangible asset more attractive to lenders as security. Interesting research published in 2012 by Maria Loumiotis at the University of Dallas, made the following findings regarding the US credit market:

> *Using a sample of secured syndicated loans, I explore the use of intangible assets as loan collateral and whether this credit practice was an innovation or a negative mutation in the corporate loan market. While intangible assets were not traditionally considered as eligible collateral, I find that twenty-one percent of U.S.-originated secured syndicated loans during 1996-2005 have been collateralized by intangibles, with intangible asset collateralization significantly increasing over this time period.* [150]

Loumioti's invaluable contribution to this debate provides preliminary evidence that intangible re-deployability and borrower reputation are positively related to the probability of using intangibles as loan collateral and that collateralizing loans by intangible significantly increases loan pricing and credit supply to firms. However, her key finding of interest for the purpose of capital regulation and CARs is that loans secured by intangibles perform no worse than other secured loans.[151] Loumioti's findings have important implications for the credit mark, the largest capital provider of innovation finance, and capital regulation. Creditors have found ways of leveraging, financing, and valuing intangible and IPR assets, benefiting both borrowers and lenders. Loumiti's research suggests that using intangibles as loan security did not significantly deteriorate lenders' credit profile. American commercial banks have also been seeking U.S. Federal Reserve regulatory approval for counting intangible assets towards loan's security for regulatory capital assets, from which they have been previously restricted.[152] Accordingly, there is some evidence for arguing that commercial

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[149] The UK, USA, Canada, Japan, Singapore and many others.

[150] M. Loumioti, 'The Use of Intangible Assets as Loan Collateral' (1 November 2012) available at SSRN: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=1748675 accessed on 15 April 2020

[151] Ibid

[152] J. H. Eisbruck, 'Credit analysis of Intellectual Property securitization: a rating agency perspective' In: *From Ideas to Assets: Investing wisely in Intellectual Property* (Bruce Berman ed., John Wiley & Sons, Inc. 2002)

banks could reduce their estimates of expected losses upon borrowers' default and their capital requirements.

Designing an IPR security friendly sustainable innovation finance system

We understand that a role of prudential capital regulation is to address bank asset valuation, legal risks and liquidity. Since 2014, Central Banks awareness of IPRs and their role in innovation has increased as set out in section 2 above. Nevertheless, many IP-rich borrowers are excluded from the credit market and are unable to obtain a loan of any kind, necessitating reliance on savings, crowdfunding, business angels and venture capital which is far more costly and less sustainable. Lenders often require company directors to give loan guaranteed by taking out a residential mortgages secured against their homes which unacceptably shifts commercial risks to the director and his or her family. Further, in June 2020, Nationwide, the UK's leading building society announced that it will now only lend to borrowers with at least a 15% deposit, amid concerns about falling house prices and negative equity, where a borrower owes more than the home is worth.[153] The typical deposit used to be only 5%, so this is a dramatic increase in the amount home buyers will need to save. Nationwide confirms the 15% minimum deposit will apply to all new house purchase, remortgage and first-time buyer applicants.[154] If other lenders in the mortgage market follow suit, the opportunities for home ownership in the UK will be limited. Adverse developments in the mortgage market, lend further weight to the argument that it is timely for central banks and lenders to re-visit the issue of intangibles and IPRs as risk-weighted bank assets for credit purposes. Perhaps designing a sustainable innovation finance system with a more expert classification of the intangibles asset class is the next logical and evolutionary step for the development of global prudential regulation.

A new role for IPR intelligence and analytics in calculating CARs and lending risk

Designing prudential regulation to adapt to the intangible economic could draw on innovations in the fields of artificial intelligence and fintech to analyse IPR portfolios for bank asset risk weighting purposes. It could be feasible for central banks and lenders to devise algorithms and create IP portfolio intelligence software to calculate registered and

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[153] Patrick Collinson, 'Nationwide triples minimum deposit for UK first-time buyers ' (17 June 2020) The Guardian, available at https://www.theguardian.com/business/2020/jun/17/nationwide-triples-minimum-deposit-for-uk-first-time-buyers accessed on 17 June 2020.

[154] Ibid

unregistered IPR-related CAR risk weightings. As the borrower's IPR matures, active loan monitoring and lending risks could be updated and adjusted, positively or negatively, as part of the prudential regulation toolkit. If central banks and lenders are armed with knowledge about the IP landscape for CAE purposes, downstream lenders will be able to better understand and evaluate the credit risk of borrower's IPR portfolios, empowering credit risk lending decisions. Loan agreements can be adapted to include relevant contractual terms to support such IPR evaluation and lender/borrower relationship.

Thus, in order to support SDG 9 and enhance sustainable innovation finance, the author recommends that the Basel Committee on Banking Supervision establish an international experts advisory group to explore the proposals put forward in this chapter, with a view to issuing IP Finance guidance to members and potential reform of the Basel Accords bank asset risk-weightings, Basel III section 67. Goodwill and Intangibles as applied to intangible, registered granted IPRs as loan security.

5 Conclusions and recommendations

Our national and global economies are part of our society which lives in the Earth's biosphere and physical environment. Advances in technology may assist to produce innovation to tackle climate changes and ensure our energy is supplied from less-polluting sources, with a greater reliance on wind, solar, and other renewable sources. In the finance domain, intangible yet legally created and state expert-examined registered IP monopoly rights are part of our collective wealth. Granted patents arguably capture the world's best innovations, known as 'inventions', so-called as they are the state of the art in the field. Registered patented inventions represent the pinnacle of innovation and have an intrinsic store of value that, in theory, could be recognized separately from the wide category of intangibles, which is based on accounting terminology and not specifically bank credit risk. Certainly, many industry sectors presently comprise firms with a high ratio of intangible assets to tangible assets. For example, the technology sector relies on computer hard patents, software copyright and its trade mark brands as key intangible assets. The green engineering and technology sectors rely heavily on design rights, patents and copyright protection. The medical sector relies on patented medicines and brands. The entertainment and media sector relies on copyright and related rights. All industry sectors rely to some degree on confidential information and internet domain names, also classed as intangible assets.

However, registered IPRs are presumed to be legally valid and provide their owners with a

potential commercial monopoly and thus 'insurance' against competition and reduce lender's risk that the borrower's business will fail. Therefore, generally speaking, over time intangible assets enhance perception of a firm's value and ultimately. The firm's intangible assets may become even more valuable than its tangible assets such as land, plant and equipment, thus bank credit risk is reduced. A firm that invests in long term assets such as intangible IPRs (especially registered rights such as patents, trade marks, copyright etc.) is laying the foundation for long term value creation, earnings and sustainable financial performance. However, a firm's long-term investment in IPRs is not only about the time frame, it also concerns alignment with long-term outcomes and structural trends such as digitalization, addressing climate change and the environment.

In this chapter I critically examined the activity of the Basel Committee on Banking Supervision and the Basel Accords[155] as they apply to intangible assets and IPRs as loan security and thus bank assets, with a view to enhancing sustainable finance and ultimately, supporting SDG 9. SDG 9 seeks to promote inclusive and sustainable industrialization while fostering innovation.[156] **P**resently, intangible assets (which includes registered granted IPRs such as patents, designs and trade marks) are not used in bank's capital adequacy ratio (CAR) risk weightings as they are treated as very low quality capital, largely due to legal certainly and liquidity concerns. The interdisciplinary traditional law and qualitative analysis presented has enabled us to build an exploratory case to support a new approach to prudential regulation and its interrelation with IPRs. The original analysis evaluated why CAR risk weighting, as **a**pplied across the whole intangible asset class, could be reviewed and potentially reformed, as a possible solution to improve how funds are actively channeled to finance urgent innovation to support SDG 9, climate change and flood risk. My exploratory proposal involves treating registered IPR assets as a separate or distinct category within the general 'intangibles' category. Given the unique commercial monopoly advantages for product and service commercialisation, low risk of revocation, proven use as loan security,[157] IPRs could now be viewed more favourably from a bank asset credit risk standpoint.

Further, IPRs increasingly have residual salvage value on insolvency of the borrower (liquidity), reducing lending risk. As long as a bank is able to meet the minimum liquidity ratio (LCR) to provide sufficient cash to cover funding need for a 30-day period of stress;

[155] The second, third and fourth of the Basel Accords issued by the Basel Committee on Banking Supervision.
[156] Supra n[14]
[157] Supra n[44]

and, the longer-term ratio net stable funding ratio (NSFR) intended to address maturity mismatches over the entire balance sheet, I theorised that prudential banking regulations should aim to adjust and fine tune bank asset risk weighting applicable to registered granted IPRs. Holding a small percentage of high quality granted IPRs as bank assets would arguably enhance the bank's credit risk, yet have the added benefit potentially stimulate IPR-backed lending**. A**ccording to Bhattacharya:

> *[The] imposition of prudential norms like capital adequacy and stricter provisioning requirements as market-safeguards, demands a carefully drawn up policy framework for the lending activities of banks and financial institutions*.[158]

As part of CAR policy, this research makes an original contribution to interdisciplinary IPR and banking law literature with new insights to nurture and advance sustainable IP debt finance transactions. Basel I was issued in 1988 and focused on credit risk and capital adequacy of financial institutions introducing the bank asset risk classifications. The Basel Accords have always been intended to evolve over time. Two decades later, in 2020, the world's central banks could pay more attention to the treatment of WTO-sanctioned and state registered, monopoly IPRs with long useful lives as a form of loan security that offers more sanctuary from risk than in the past. The novelty, legal certainty and validity of registered granted patents is arguably higher than in pre-computer technology and Internet age, circa mid-1980s. Yet, the CAR applicable to the intangibles asset class as a whole, has not changed significantly, treating all intangibles uniformly as low quality capital. As standard maker, the BCBS has the power and legitimacy to make a real direct impact on banking CARs with respect to registered IPRs which are frankly, a commercial necessity in the market.

The evolving sustainable finance market is currently responding to the global targets set in the UNEP Principles of Responsible Banking (PRB) launched on 23 September 2019.[159] The PRB are accelerating the banking industry's contribution to achieving society's goals as

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[158] H. Bhattacharya, *Banking Strategy, Credit Appraisal and Lending Decisions: A Risk-Return Framework* (2010) Oxford University Press, Oxford, pp386-388.

[159] The PRB have been developed by the banking industry itself, together with the United Nations Environment Programme Finance Initiative (UNEP FI) – a **U**N-private sector collaboration that includes membership of more than 240 finance institutions around the globe, see https://www.unepfi.org/banking/bankingprinciples/ accessed on 14 April 2020.

expressed in the Sustainable Development Goals and the Paris Climate Agreement but do not address capital regulation.[160] While there are capital risks in getting IPR as loan security and green finance wrong, a top-down review of CARs with respect intangibles and IPRs should be based on a thorough understanding of how CARs affect each type of intangible asset within the wider class. Potential reform to unbundle the Goodwill and Intangibles asset class which is currently tied to the definition of intangibles as set out in IAS Intangibles 38 may improve the impact of regulatory constraints on innovation and economic productivity. Central banks could take a more holistic approach to CARs and more accurately classify intangible registered granted IPR assets against banking credit risk, thereby optimizing bank capital. Such an approach might assist the BSBC, BIS and GSOH to adapt prudential regulation to the shift in business models in the fourth and fifth industrial revolutions by modernizing capital-management plans and regulation. Designing a contemporary IPR-friendly regulatory banking environment, well-positioned to prudently lend to IPR rich borrowers may be an important component for sustainable finance. Appropriate IPR analytics software, now available, could be developed by the central banking community in conjunction with banks to assign more accurate lending risk to IPRs as capital with a view to adjusting banking capital adequacy weightings for registered granted IPRs.

In conclusion, in this Chapter I have evaluated the impact and potential reform to banking capital adequacy requirements and CAR for intangibles and IPRs as part of the wider green and blue finance initiatives to improve the flow of capital to innovation needed to solve planetary issues support sustainability. This topic, to my knowledge, has not been addressed in the interdisciplinary academic sustainable finance or IPR literature in depth before. An exploratory case has provided qualitative and traditional legal analysis to inform an argument that the BSBC and central banks are aware and potentially more amenable to adopting a more risk-tolerant approach to IPRs, especially registered IPRs, in light of the deterioration of other bank assets such as residential mortgages. The shaky bridge that links IPR-rich borrowers with bank finance could be re-designed to provide better access for innovation firms and made stronger the central banks and financial sector embrace financial technology e.g. IPR portfolio analytics, to support bank asset credit risk assessment. Howard Crosse, former Vice-President of the Federal Reserve Bank of New York, states that “the very act of formulating a policy and expressing it in words that all agree will sharpen the issues and make the end

[160] Ibid

product more effective".[161] Of course, it is essential to balance prudential banking regulation with the interests of other stakeholders in the lending environment to achieve the best possible outcome and maintain trust in banks. A challenge for the Basel Committee will be to reflect on how bank asset capital risk weightings for the intangibles asset class could be activated across multiple jurisdictions, especially those without online IPR registers**.** Further debate is necessary in the finance world. In addition, empirical research and risk modelling on the impact of CARs on registered granted IPRs as bank capital assets, as a specific monetary policy factor in the overall mix of bank assets, is necessary. That said, it is timely for prudential regulation to evolve alongside business and the economies the banking community serves. This chapter has hopefully enriched the sustainable finance literature and provided original thinking that may act as a catalyst to improve access to sustainable innovation finance for IP rich business borrowers, small or large, while achieving society's goals as expressed in the UN 2030 sustainability agenda SDG 9.

[161] Crosse, H. D. (1962)