



Gendered Innovation: Female Patent Activity and Market Development in Brazil, 1876–1906

Kari Zimmerman

In January of 1897 the Commercial Tribunal of Brazil issued Maria Clémencia Castagnone a patent for her method of sterilising and bottling carbonated water. Maria Clémencia was not new to the food industry in Rio de Janeiro. With her husband's formal permission, she co-owned and operated a business selling dry goods from 1893 to 1896.¹ It was here that she and her partner first started testing the market for carbonated water using a bottling method initially patented by her spouse. By the time

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¹Arquivo Nacional (hereafter AN) 'MC Castagnone & Cia,' Livro 281, Registro 39084, 1893 & Livro 323, Registro 43296, 1896.

K. Zimmerman (✉)
University of St. Thomas, St Paul, MN, USA
e-mail: kezimm@stthomas.edu

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Maria Clémencia received her own patent specifically for water, she had shifted her industry specialisation and her business plan. According to a local newspaper, M.C. Castagnone & Company joined with another firm to become the exclusive distributors of carbonated water in the capital city.²

It is not clear how much financial success Maria Clémencia gained from her invention, but her patent activity highlights some key elements of female entrepreneurship and property rights in Brazil's developing market at the end of the nineteenth century. Historical examinations of economic growth often look to patents as a measure of how national laws and policies both advanced the technical change necessary for development and created a market that welcomed participation from multiple sectors of society.³ Thus, an important factor in female patent activity was the role of coverture. Several scholars argue that married women's property laws impeded female patent activity due to their lack of control over their own inventions.⁴ The Brazilian legal system of the Empire and Old Republic subordinated wives to their husbands, but women maintained a modicum

²AN, Privilégios Industriais (hereafter PI) 3211, Patent 3550, 1901 & *O Paiz*, 06/07/1896.

³Stanley L. Engerman & Kenneth L. Sokoloff, 'Factor Endowments, Institutions, and Different Paths of Growth Among New World Economies', in Stephen Haber (ed.), *How Latin America Fell Behind: Essays on the Economic Histories of Brazil and Mexico, 1800–1914* (Stanford: Stanford University Press, 1997): pp. 260–304, pp. 284–5; B. Zorina Khan, '“Not for Ornament”: Patenting Activity by Nineteenth-Century Women Inventors', *Journal of Interdisciplinary History* 31, no. 2 (Autumn, 2000): pp. 159–95, p. 163 and Petra Moser, 'How Do Patent Laws Influence Innovation? Evidence from Nineteenth-Century World Fairs', NBER Working Paper 9909 (2003): pp. 1–52.

⁴In both England and North America, coverture mandated that a woman's assets, as well as her labour and future earnings, became her husband's property upon marriage. Although the passage of the Married Women's Property Act (in 1882 in England and between the 1830s and 1870s in the United States) technically nullified the laws of coverture, most women did not exercise unrestricted control over their property. For a discussion of the relationship on patent activity and Married Women's Property Acts, see B. Zorina Khan, 'Married Women's Property Laws and Female Commercial Activity: Evidence from United States Patent Records, 1790–1895', *The Journal of Economic History* 56, no. 2, papers presented at the Fifty-Fifth Annual Meeting of the Economic History Association (Jun 1996): pp. 356–88 and Deborah J. Merritt, 'Hypatia in the Patent Office: Women Inventors and the Law, 1865–1900', *American Journal of Legal History* 35, no. 3 (Jul 1991): pp. 235–306. More general discussions of these laws and working women in the United States and England can be found in Norma Basch, *In the Eyes of the Law: Women, Marriage, and Property in Nineteenth-Century New York* (Ithaca: Cornell University Press, 1982); Lee Holcombe, *Wives and Property: Reform of the Married Women's Property Law in Nineteenth-Century England* (Toronto: University of Toronto Press, 1983); and Suzanne Lebsack, *The Free*

of control over their personal and conjugal property.⁵ Moreover, both commercial and civil law provided a number of incentives for female market activity. Given these favourable legal conditions, it is somewhat surprising that only 105 patents were issued to women between 1880 and 1910. Certainly, Maria Clémencia's invention was an important part of her larger business plan and it led to additional patents in food packaging. Only a few other women followed suit, forcing the question of whether female patent activity was a response to market change and reinforced property law, or if it was a specific entrepreneurial strategy. This small collection of patent applications points to much larger trends in Brazil's political economy and ultimately suggests that female entrepreneurs were more focused on protecting their space in the local market than their technological invention at the global scale.

Examining the relationship between female entrepreneurship and institutional structure, this chapter argues that patent registration represents one of the many strategic ways that women used property law to facilitate their dynamic and sustained participation in the Brazilian economy at the end of the nineteenth century. Female entrepreneurs owned and operated a significant share of private businesses in Rio de Janeiro, the nation's political and economic capital, between 1875 and 1910. In addition to government policies on intellectual property that encouraged market participation, Brazil's commercial and civil laws opened several avenues for female economic activity. The Commercial Code required spousal consent for married women to enter into business arrangements, but widows and

Women of Petersburg: Status and Culture in a Southern Town, 1784–1860 (New York: W.W. Norton & Co., 1984), especially Chapter 3.

⁵ Candido Mendes de Almeida (ed.), *Código philippino ou ordenações do reino de Portugal*, 14th ed. (Rio de Janeiro: Instituto Philomatico, 1870), Livro 4, Títulos 42–46 and Título 96 (hereafter *Ordenações*). After independence in 1822, Brazilian family and inheritance law closely followed the *Ordenações Filipinas*, or Philippine Code of Portugal, until the enactment of the Civil Code of 1916. Susan K. Besse, *Restructuring Patriarchy: The Modernization of Gender Inequality in Brazil, 1914–1940* (Chapel Hill: University of North Carolina Press, 1996), p. 13; Dain Borges, *The Family in Bahia, Brazil 1870–1945* (Stanford, California: Stanford University Press, 1992), p. 155; Sandra Lauderdale Graham, 'Making the Private Public: A Brazilian Perspective', *Journal of Women's History* 15, no. 1 (2003): pp. 28–42, pp. 30–31; and Muriel Nazzari, 'Widows as Obstacles to Business: British Objections to Brazilian Marriage and Inheritance Laws', *Comparative Studies in Society and History* 37, no. 4 (Oct 1995): pp. 781–802, p. 781.

single females enjoyed the same legal rights as men.⁶ Significantly, unlike many Western nations, women did not cede absolute control of their property upon marriage under Brazil's civil legislation.⁷ These legal assurances provided means and motivation for female entrepreneurship. Nevertheless, equally influential upon women in Rio de Janeiro was the separate spheres ideology that ordered society well into the twentieth century. Prescriptive literature prioritised female domesticity while politicians and intellectual leaders linked motherhood to the sanctity and development of the nation.⁸ Even calls for education in the feminist press were often associated with the needs for women to serve as an informed spouse and appropriate teacher for her children.⁹ Forced to negotiate in ways that best represented the dichotomous demands of their business and their sex, it seems that patents were one of the many legal rights that female entrepreneurs employed to ensure their continued place in the market.

Female patent activity in Brazil calls into question traditional conclusions on the roles of both women and property rights in national economic development. Investigations of female entrepreneurship in general are conspicuously absent from the literature on business formation and capital markets in Latin America during the nineteenth century. To be certain, scholars recognise the importance of family capital and labour in commerce, including the tacit contributions of its female members. However, in light of the social pressure towards female domesticity, these women are typically relegated to auxiliary positions.¹⁰ Likewise, research

⁶ *Leis e Decretos*, Law 556, 15 June 1850 (Código Commercial do Império do Brazil), Artigo 1, note 4.

⁷ *Ordenações*, Livro 4, Títulos 42–46 and Título 96.

⁸ Maria Fernanda Baptista Bicalho, 'A imprensa feminina e a campanha suffragista no início da República', *Caderno Espaço Feminina*, Uberlândia 6, no. 6 (1999): pp. 7–19; June Hahner, *Emancipating the Female Sex: The Struggle for Women's Rights in Brazil, 1850–1940* (Durham: Duke University Press, 1990), p. 73; and Jeffrey D. Needell, *A Tropical Belle Époque: Elite Culture and Society in Turn-of-the-Century Rio de Janeiro* (Cambridge: Cambridge University Press, 1988), p. 214.

⁹ See *Eco da Damas* and *O Belo Sexo* and Hahner, *Emancipating the Female Sex*, p. 31.

¹⁰ For a larger discussion pertaining to Brazil, see Sergio de Oliveira Birchal, *Entrepreneurship in Nineteenth-Century Brazil: The Formation of a Business Environment* (New York: St. Martin's Press, 1999); Warren Dean, *The Industrialization of São Paulo, 1880–1945* (Austin: University of Texas Press, 1969); Anne G. Hanley, 'Is it Who You Know? Entrepreneurs and Bankers in São Paulo, at the Turn of the Twentieth-Century', *Enterprise and Society* 5, no. 2 (2004): pp. 187–225; Eugene Ridings, *Business Interest Groups in Nineteenth-Century Brazil* (Cambridge: Cambridge University Press, 1994); and Joseph Sweigart, 'Financing

on the importance of property rights in business development often explains that the civil legislation on family estates compelled a number of widows to enter the market *despite* their presumed inclination towards the domestic sphere.¹¹ The emphasis on marital status and inheritance firmly situates women within broader analyses of economic development but limits historical understandings of female entrepreneurship to exceptional wives and widows, whose market activity was the result of familial or financial obligations. Perhaps more importantly, the narrow focus on family ties overlooks the proactive ways in which women participated in commerce, such as patent registration, regardless of the motivating circumstances. It tends to establish as a foregone conclusion that, given the financial opportunity, women abstained from the market due to Brazilian social norms stressing marriage and motherhood. Recognising how female entrepreneurs utilised the law to both enter and actively participate in the economy introduces new scholarly questions about the significance of technological innovation, property rights, and gendered expectations of domesticity in market development.

This chapter relies on patent activity as a lens for better understanding the relationship between female entrepreneurship and the law in the Brazilian economy at the end of the nineteenth century. Analysing female patent applications submitted between 1880 and 1910, the first section of this chapter details the types of industries and technological inventions in which women concentrated their efforts.¹² Although limited in number and lacking detailed information on the patentee themselves, such as in the case of Maria Clémencia, when considered with other business sources, the applications offer a Brazilian case study within larger trends in female entrepreneurship across the Americas. Female patentees in Rio de Janeiro

and Marketing Brazilian Export Agriculture: The Coffee Factors of Rio de Janeiro, 1850–1888' (Ph.D. diss., University of Texas at Austin, 1980), Chapter 3.

¹¹ June Hahner, 'Women and Work in Brazil, 1850–1920: A Preliminary Investigation', in Dauril Alden and Warren Dean (eds), *Essays Concerning the Socioeconomic History of Brazil and Portuguese India* (Gainesville: University Presses of Florida, 1977): pp. 87–117, esp. pp. 89–90; Linda Lewin, *Politics and Parentela in Paraíba: A Case Study of Family-Based Oligarchy in Brazil* (Princeton: Princeton University Press, 1987), pp. 192–194; and Nazzari, 'Widows as Obstacles to Business', p. 781.

¹² The records for patent applications housed in the Brazilian National Archive span the years 1871–1910, with 1 patent filed in 1857 and 42 listed as 'without a date'. This chapter focuses on the period beginning in 1875 in order to correspond with the nation's early legislation on intellectual property, but the bulk of the analysis centres on 1880–1910, when female patentees first began filing their applications (1881). *PI*, 1857–1910.

developed their technology at similar rates and industries as their regional counterparts but their inventions reflect the specific market demands and conditions of Brazil. The second section considers the legal system that encouraged this type of deliberate female entrepreneurship and innovation. Technically, the nation's commercial and civil laws, as well as the government's commitment to international patent agreements, created multiple opportunities for women to protect their intellectual property. Yet the women mirroring the efforts of Maria Clémencia to patent their inventions demonstrates how property rights was only one of many factors in female entrepreneurship. The final section of this chapter considers patent activity as part of a larger entrepreneurial strategy for women in commerce. Given that Brazilian civil law already encouraged a large number of women to pursue business in Rio de Janeiro, female patent activity was not necessarily a response to property rights but rather a tool for market success. The shrewd use of patents by female entrepreneurs in nineteenth-century Rio de Janeiro indicates the contradictory ways in which the legal code and gender norms produced a limited but strategic role for women in business specifically and national economic development more generally.

FEMALE PATENT ACTIVITY IN BRAZIL

The Brazilian economy provided a number of opportunities for female entrepreneurship in the second half of the nineteenth century. Though the nation was late to industrialise, the coffee boom of 1880 increased the domestic demand for goods and services related to secondary markets, improved infrastructure and a burgeoning population in the centre-south region.¹³ Women established businesses to serve the expanding economy

¹³ Dante Mendes Aldrighi & Renato Perim Colistete, 'Industrial Growth and Structural Change: Brazil in a Long-Run Perspective', in Wim A. Naudé, Adam Szirmai, & Nobuya Haraguchi (eds), *Structural Change and Industrial Development in the BRICS* (Oxford: Oxford University Press, 2015): pp. 162–98, pp. 168–171; Anne G. Hanley, 'Financing Brazil's Industrialization', in Jeff Horn, N. Rosenbamd, & Merritt Roe Smith (eds), *Reconceptualizing the Industrial Revolution* (Boston: MIT Press, 2010): pp. 251–70, p. 254 and Brazil, Directoria Geral de Estatística, *Recenseamento da população do Imperio do Brasil a que se procedeu no dia 1º de agosto de 1872* (Rio de Janeiro: Leuzinger, 1873–1876); *Recenseamento geral da Republica dos Estados Unidos do Brasil em 31 de dezembro de 1890. Districto Federal (Cidade do Rio de Janeiro) Capital da Republica dos Estados Unidos do Brasil* (Rio de Janeiro: Leuzinger, 1895); and *Recenseamento do Rio de Janeiro (Districto Federal) realizado em 20 de setembro de 1906* (Rio de Janeiro: Oficina de Estatística, 1907).

with the support of Brazil's commercial and civil laws. Along with the guarantees provided by the Commercial Code for most female entrepreneurs to engage in the market without restriction, the nation's civil legislation on property rights provided women with considerable control over the capital necessary for new entrepreneurial pursuits.¹⁴

Intellectual property rights supported by both the imperial and Republican governments offered further motivation.¹⁵ Tempering market demands and legal prescription, however, were the strong social expectation for women to privilege their domestic responsibilities over any commercial obligation or interest. Journalists, intellectuals and politicians all wrote frequently of the crucial link between women and the home.¹⁶ These opposing circumstances ensured that women played a small but significant role in Brazil's developing economy. Female entrepreneurs were involved in roughly 10 per cent of all commercial establishments, with at least 1000 women in formal partnerships, 400 operating sole proprietorships and 325 licensed for market vending.¹⁷

Like Maria Clémencia's business plan, patent registration was a logical extension of commercial activity for many female entrepreneurs, but it was certainly one of the less dynamic sectors of the market. Approximately 1

See also Richard Graham, *Britain and the Onset of Modernization in Brazil, 1850–1914* (London: Cambridge University Press, 1968) and William R. Summerhill, 'Transport Improvements and Economic Growth in Brazil and Mexico', in Stephen Haber (ed.), *How Latin America Fell Behind: Essays on the Economic Histories of Brazil and Mexico, 1800–1914* (Stanford: Stanford University Press, 1997): pp. 93–117.

¹⁴ *Leis e Decretos*, Law 556, 15 June 1850 (Código Commercial do Império do Brazil), Artigos 1 & 27–29 and *Ordenações*, Livro 4, Títulos 42–46 and Título 96.

¹⁵ *Leis e Decretos*, Decree 2,682, 23 October 1875; Decree 3,346, 14 October 1887 and Decree 1,236, 24 September 1904.

¹⁶ Bicalho, 'A imprensa feminina e a campanha suffragista no início da República', pp. 7–19; Hahner, *Emancipating the Female Sex*, p. 73; and Needell, *A Tropical Belle Époque*, p. 214.

¹⁷ There is no way to determine the precise percentage of the female population engaged in commerce in the end of the nineteenth and early twentieth centuries due to inconsistent census records and a lack of a directory of the Commercial Tribunal (housed at the AN). My estimates are based on thorough reviews of formal business partnership contracts, requests for business licences in Rio de Janeiro and the *Almanak Laemmert*, the annual city business directory. Evidence from Rio de Janeiro is corroborated at the national level by Besse, *Restructuring Patriarchy*; Birchall, *Entrepreneurship in Nineteenth-Century Brazil*; and Hahner, *Emancipating the Female Sex. Almanak Administrativo, Mercantil e Industrial do Rio de Janeiro* [Almanak Laemmert]; Arquivo Geral da Cidade do Rio de Janeiro, Licenças para Commercio e Industria and AL, 1870 and 1880 and AN, Junta Commercial, *Livro de Registros*, 1869–1904.

per cent of registered female entrepreneurs in formal partnerships applied for patents compared to 4.5 per cent of their male colleagues. Likewise, women received 1 per cent of the 9088 patents issued by the Commercial Tribunal between 1880 and 1910.¹⁸ Of course, trademark registration was not relevant to all commercial pursuits nor was every entrepreneur equipped with the vocational and financial resources to catalogue the components of their invention and file their paperwork. Regardless of an entrepreneur's request for a preliminary patent for 3 years or the standard 15-year patent, applications required a comprehensive description and illustration of the invention.¹⁹ Without complete biographical sketches of each patentee, it is impossible to gauge the feasibility of patenting, especially because demographic information was not included on the applications. These rates of registration seem reasonable, however, when considering that women in the United States similarly represented 1 per cent of all patent activity and comprised 4 per cent in nearby Chile.²⁰ It appears that, regardless of national rates of industrialisation, technological innovation at the hands of women remained on the margins.

Women in Brazil were typical of other female patentees across the Americas in terms of rates and popular categories of inventions. Table 15.1 presents the industrial distribution of female patents between 1880 and 1910. The two most common types of invention were related to food processing and clothing, just as in Chile and the United States.²¹ Maria Clémencia's invention for carbonated water was matched by methods for canning meat and preserving bread, while patents related to apparel included corsets and a method for attaching pins to brooches. But even these most popular options each only accounted for less than 20 per cent of female patent activity. Women patented a range of inventions, ranging from industrial machinery to health remedies. Down the street from Maria Clémencia's firm, Georgina Figueredo Reid co-owned a pharmacy where she sold 'London Pectoralis', her patented medicine for respiratory

¹⁸ AN, Junta Commercial, *Livros de Registros*, 1869–1904 & PI, 1880–1910.

¹⁹ Applications did not always include the design and a few illustrations were submitted without the complete written description of the invention. AN, Junta Commercial, PI, 1880–1910.

²⁰ Bernardita Escobar Andrae, 'Female Entrepreneurship and Participation Rates in Nineteenth-Century Chile', *Estudios de Economía* 42, no. 2 (December, 2015): pp. 67–91, p. 81 and Merritt, 'Hypatia in the Patent Office', p. 289.

²¹ Escobar Andrae, 'Female Entrepreneurship and Participation Rates in Nineteenth-Century Chile', p. 82 and Merritt, 'Hypatia in the Patent Office', p. 254.

Table 15.1 Industrial distribution of patent applications filed by women in Brazil between 1880 and 1910

	<i>Number</i>	<i>Percentage</i>
Food preservation	20	19
Clothing and accessories ^a	18	17
Industrial ^b	17	16
Tools for transportation	8	7
Chemical	7	6
Metallurgy	6	6
Health/Medical	6	6
Soap manufacturing	6	6
Signage ^c	5	5
Music and games	5	5
Kitchen utensils	1	1
Misc	6	6
N Obs	105	100

Source: Arquivo Nacional, Privilégios Industriais, 1880–1910

^aRetail and manufacture of clothing and accessories, including corsets

^bSmall machinery and/or components for industrial machines

^cSigns for residential and commercial use

disease.²² The variety of industrial pursuits prevented concentration in any one activity but in combination, innovation related to the domestic sphere comprised nearly half of all patents.

While most of the female inventions were associated with commercial domesticity, Table 15.1 also highlights some unique attributes of the Rio de Janeiro economy. Primarily, it seems that the two most common patent categories were more a function of industry knowledge than household necessity. For example, approximately two-thirds of the applications related to clothing were for corsets. This is hardly surprising given the global popularity of corsets at the end of the nineteenth century. Women's involvement in corset manufacturing led to inventions that were trademarked at disproportionate rates to their overall patent activity, ranging from 10 to 35 per cent of all corset patents issued in England, France and the United States.²³ Several female entrepreneurs in Brazil developed

²² AN, 'Guimarães & Fairbairn,' Livro 429, Registro 53859, 1904 & PI 3211, Patent 3550, 1901.

²³ B. Zorina Khan, 'Invisible Women: Entrepreneurship, Innovation and Family Firms in France During Early Industrialization', NBER Working Paper 20854 (2015): pp. 1–41,

original corsets as an extension of their current commercial endeavours. The patent issued to Anna Maria Torres for her corset design was consistent with her business selling clothing, hats and costumes.²⁴ At least two other women attributed their unique models to their experiences as seamstresses. Rafaela Carbó described her process of expertly sewing together 14 pieces of fabric that extended the corset across the hips, thereby reducing compression on the stomach, whereas Alice Jacobsen submitted three improvements to her design over the course of two years that ‘suppressed one panel (*through creative stitching*), making it easier, less time consuming, and costly to produce the corset’.²⁵

Paid labour associated with clothing was clearly an important factor for several female entrepreneurs, but missing among the different types of patents were large numbers of inventions related to the care and production of apparel as well as general improvements to domestic work. Beyond soap manufacturing, there were very few applications by women for the type of household products that dominated patent activity in other markets.²⁶ Nearly 10 per cent of patents filed by women in the United States during the nineteenth century were for kitchen utensils; yet in Brazil, only one woman submitted an application for a machine-operated grater specifically for manioc.²⁷ Inventions connected to the domestic sphere were still the purview of female patentees but it seems they were more a result of the work they performed outside of the home, not inside.

One important consideration in understanding the different types of female innovation was the predominance of slave labour in Brazil. Several historians of patent activity in the United States link the bulk of female patents to the demands of household chores like cleaning, cooking and sewing. In nineteenth-century Brazil, domestic slaves and servants most commonly performed these chores.²⁸ Of course, this is not to say that

p. 10; Kara W Swanson, ‘Getting a Grip on the Corset, Gender, Sexuality, and Patent Law’, *Yale Journal of Law & Feminism* 23, no. 1 (2011): pp. 57–115; and Leigh Summers, *Bound to Please: A History of the Victorian Corset* (London: Bloomsbury Press, 2001), pp. 23–29.

²⁴ AN, PI 1800, Patent 2188, 1897 and *Jornal do Commercio*, 28/09/1897.

²⁵ AN, PI 3.132, 1901 and 3 patents for Alice Jacobsen: PI 4601, Patent 4926, 1907; PI 5344, Patent 5647, 1908 and PI 7886, Patent 8688, 1909.

²⁶ Khan, ‘Not for Ornament,’ p. 161; Merritt, ‘Hypatia in the Patent Office’, pp. 254 & 276; and Autumn Stanley, *Mothers and Daughters of Invention: Notes for a Revised History of Technology* (Rutgers, NJ: Rutgers University Press, 1995).

²⁷ AN, PI 3211, Patent 1252, 1893 and Khan, ‘Not for Ornament’, p. 177.

²⁸ Mary Karasch, *Slave Life in Rio de Janeiro, 1808–1850* (Princeton: Princeton University Press, 1987), pp. 49–50, 185; Sandra Lauderdale Graham, *House and Street: The Domestic*

Brazilian women were completely free of domestic responsibilities or concerns but, rather, it deeply influenced patterns of female invention.²⁹ Only two women applied for patents associated with laundry, one was a new approach to ironing and the other included a design for a large-scale machine for treating clothing and fabric.³⁰ In contrast, women in the United States patented over 50 machines for washing or drying clothes between 1865 and 1900.³¹

Female patent applications in Brazil reflect regional differences in labour as well as economic growth. A final conclusion from Table 15.1 is the number of technological pursuits indirectly associated with the coffee industry. Brazil became the world's largest supplier of coffee in the last quarter of the nineteenth century, leading to innovation in domestic manufacturing that linked to the nation's key export. Women who applied for patents for machinery, transport equipment, chemical products and metal trades, those industries comprising the second third of Table 15.1, often met the demands of Brazil's expanding market. Maria Rita Nunes Pimentel developed a process for preventing metal oxidation in small engines. Advances in machinery were key to the industries that burgeoned in part due to coffee transport and accounted for 25–30 per cent of all inventions at the turn of the twentieth century.³² Likewise, the widow Claussen received a patent for 15 years for her chemical coagulant used for 'superior fertiliser' for industrial agriculture, such as in coffee production.³³ The number of female patentees in each industry related to coffee was certainly smaller than that in innovations for food and clothing, but their proportion mirrors general trends with all patents filed between 1880 and 1910, demonstrating the dynamic contribution of women in national economic development.

World of Servants and Masters in Nineteenth-Century Rio de Janeiro (Cambridge: Cambridge University Press, 1988), pp. 12–15, 19; and Maria Odila Leite da Silva Dias, *Power and Everyday Life: The Lives of Working Women in Nineteenth-Century Brazil* (Cambridge, UK: Polity Press, 1995).

²⁹ Graham, *House and Street*, 12–15 and Khan, 'Married Women's Property Laws and Female Commercial Activity', p. 372.

³⁰ AN, PI 4.39, Patent 4714, 1907 and PI, 1.788, Patent 2190, 1897.

³¹ Merritt, 'Hypatia in the Patent Office', p. 276.

³² AN, PI 4768, 1907. Aldrighi & Colistete, 'Industrial Growth and Structural Change', p. 171 & Teresa Cribelli, *Industrial Forests and Mechanical Marvels: Modernization in Nineteenth-Century Brazil* (Cambridge, MA: Cambridge University Press, 2016), p. 134.

³³ AN, PI 8.859, Patent 171, 1884.

The variety of industries represented by female patentees in Brazil questions traditional interpretations of the role of women in advancing technology across the Americas at the end of the nineteenth century. While inventions for commercial domesticity were the most popular, these industries did not predominate as they did in neighbouring countries. Widespread availability of domestic service in Brazil, whether slave or free, undoubtedly diminished the need for household innovation. At the same time, the diverse collection of female patents linked to the flourishing coffee market highlights how women fostered the technological change necessary for economic growth. It also directly connects female entrepreneurship to larger initiatives of the state. This next section further considers the motivations of female patentees by examining legal and fiscal policies designed to bolster the Brazilian economy.

PATENT LAW UNDER THE EMPIRE AND REPUBLIC, 1875–1910

The development of Brazil's intellectual property law was somewhat incongruous with the nation's export agriculture economy. Brazil was one of the first countries in Latin America to enact a law on patents in 1875, but few of the imperial government's policies encouraged industrialisation or technological innovation not related to exports. In addition to a potential loss in profits from a shift away from agriculture, taxes on manufactured imports provided the bulk of the government's revenue. At the same time, government restrictions on forming joint-stock corporations prevented entrepreneurs from mobilising the capital necessary to fund large industrial firms. Finally, the persistence of slavery in Brazil until 1888 proved an obstacle to large-scale manufacturing on multiple fronts, including its constriction of a consumer base for purchasing manufactured goods.³⁴ These factors associated with the imperial government account for the slow rates of industrialisation and patent activity throughout the second half of the nineteenth century.

³⁴ Hanley, 'Financing Brazil's Industrialization', p. 253; Nathaniel Leff, 'Economic Development in Brazil, 1822–1913', in Stephen Haber (ed.), *How Latin America Fell Behind: Essays on the Economic Histories of Brazil and Mexico, 1800–1914* (Stanford: Stanford University Press, 1997): pp. 34–64, pp. 42–46; and Wilson Suzigan, *Indústria brasileira: origem e desenvolvimento* (São Paulo: Brasiliense, 1986), especially Chapter 1.

The Republican government that assumed power in 1889 viewed technological development as a crucial priority for expanding an economy perceived as hobbled by slavery and backward imperial policies. To stimulate industrialisation, the new regime immediately initiated financial and legal reforms that ironically built upon changes enacted in the final years of the Empire. In 1882, the government eased the requirements for incorporation and thereby opened the possibility for large-scale investment into industrial ventures.³⁵ One year later, Brazil was a signatory country of the Paris Convention, which established an international agreement to ensure equal treatment of patents and protection of intellectual property.³⁶ The Republic expanded these two policy shifts to mixed degrees of success. The 1890 finance laws essentially made it easier to invest in corporations by increasing the availability of credit while it reduced the liability associated with stock options. By extending the 1882 allowance for joint-stock formation, the government facilitated an immediate rush to invest in new companies. Ultimately the introduction of limited liability enabled the Republic to realise their goal of sustained industrialisation, but in the immediacy, it created a speculative bubble that caused great financial instability.³⁷ In contrast, the legal improvements to the patent process led to consistent growth of innovation. The Republican government passed a series of intellectual property laws beginning in 1890 in order to ensure legal compliance with the Paris Convention and the federalist model of the new Constitution, promulgated in 1891. These laws strengthened the administration of patents and issued the first clear set of consequences for

³⁵ Hanley, 'Financing Brazil's Industrialization', p. 257 and William R. Summerhill, *Inglorious Revolution: Political Institutions, Sovereign Debt and Financial Underdevelopment in Imperial Brazil* (New Haven: Yale University Press, 2015), pp. 282–6.

³⁶ Josh Lerner, '150 Years of Patent Protection.' NBER 7478, 2000: pp. 1–58 and Teresa da Silva Lopes, Carlos Gabriel Guimarães, Alexandre Saes and Luiz Fernando, 'The "Disguised" Foreign Investor: Brands, Trademarks and the British Expatriate Entrepreneur in Brazil,' *Business History*, : pp. 1–25, p. 6

³⁷ *Leis e Decretos* Decree 164, 17 January 1890 and Stephen Haber, 'The Efficiency Consequences of Institutional Change: Financial Market Regulation and Industrial Productivity Growth in Brazil, 1866–1934', in John H. Coatsworth and Alan M. Taylor (eds), *Latin America and the World Economy since 1800* (Cambridge: Harvard University Press, 1998): pp. 275–322, pp. 277–278; Hanley, 'Financing Brazil's Industrialization', pp. 257–8; and Gail D. Triner, *Banking and Economic Development: Brazil, 1889–1930* (New York: Palgrave, 2000), Chapter 2.

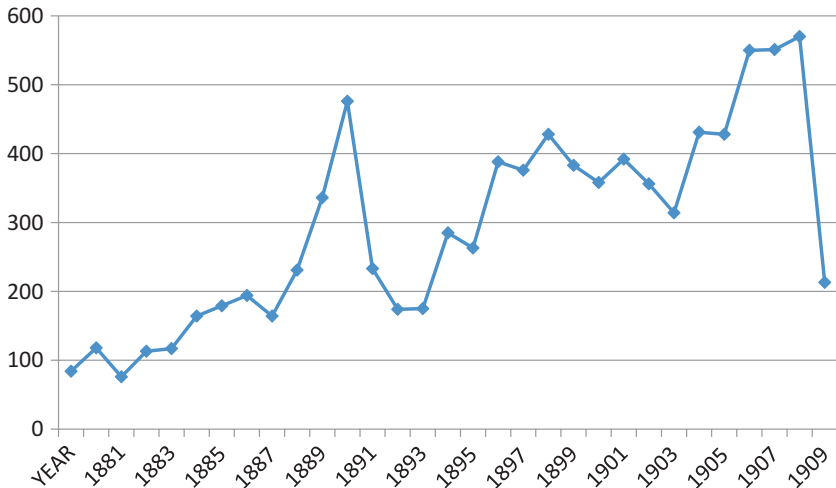


Fig. 15.1 Total number of patent applications, by women and men, filed in Brazil between 1880 and 1910. (Source: Arquivo Nacional, Privilégios Industriais, 1880–1910)

imitation with the Law of 1904.³⁸ Figure 15.1 shows the rise in patent applications from 1880 to 1910, including the adjustments corresponding to the speculative bubble of the early 1890s and patent law of 1904.

Within the first few years of the twentieth century, Brazil's developing market proved attractive to local and foreign entrepreneurs alike. The international recognition of patents and national enforcement of intellectual property rights served to stimulate industrialisation and economic growth but also helped create a population of foreign nationals. At least one-third of all patentees listed their permanent residence outside of Brazil, with the percentage increasing over time. Foreign nationals represented 36 per cent of the patentees in 1884, one year after the Paris Convention, and accounted for nearly one-half by 1906.³⁹ With the

³⁸ Lerner, '150 Years of Patent Protection', p. 25 and Da Silva, et. al., 'The 'Disguised Foreign Investor'', p. 6.

³⁹ Out of the 9088 registered patents between 1880 and 1910, 7400 applicants listed their permanent residence, with 61 per cent local to Brazil. A total of 46 different countries were listed in the patent registry, with the top 5 nations represented being the United States (10%), England (8%), France (7%), Germany (4%) and Argentina (2%). PI, 1880–1910.

majority hailing from highly industrialised nations like the United States and England, their patents likely increased levels of innovation in Brazil. A recent investigation of British patentees found that they were instrumental in the transfer of technological and entrepreneurial knowledge in the development of the textile industry.⁴⁰ Although patent applications alone do not speak to knowledge transfer or technological advance, the increasing number of foreign entrepreneurs seems to validate the efforts of Republican government leaders to stimulate economic growth.

A closer examination of the role of foreign nationals among the female patentees presents an alternative conclusion on the influence of property rights on female entrepreneurial activity in Brazil. Roughly 45 per cent of the women who received patents in Brazil lived abroad. Of course, Maria Clémencia originally hailed from France, and at least one-third of women involved in business partnerships like herself were foreign born but considered Brazil their home.⁴¹ It is not clear whether the other foreign women who received patents at the turn of the twentieth century ever stepped foot in Brazil, let alone weighed investments into local industries. Women like Harriet Ruth Tracy, a well-known inventor in the United States, relied on a local firm to file her patent application for a sewing machine part in 1889.⁴² In other words, intellectual property law was a secondary concern for this particular device. Brazil's efforts to strengthen their patent law did not spur Tracy's invention and probably had little to do with the products patented by the other foreign nationals. This is not to say that Brazil's patent laws did not matter, but rather it was the way female entrepreneurs incorporated them into their larger business plans that mattered. Relying on the guarantees of the Paris Convention, Tracy's patent provided equal protection for her product and her place in Brazil's market. A similar approach is evident in the patent activity of Brazilian female entrepreneurs. My final analysis offers a nascent hypothesis on the significance of patents within the context of female property rights in Brazil.

⁴⁰ Da Silva, et. al. 'The 'Disguised Foreign Investor', p. 14. Others have studied the role of the British in industrialisation, but this examination is the first to focus on British patent holders in Brazil in particular. See Birchal, *Entrepreneurship in Nineteenth-Century Brazil*; Graham, *Britain and the Onset of Modernization in Brazil*; Ridings, *Business Interest Groups in Nineteenth-Century Brazil*; and Suzigan, *Industria Brasileira*.

⁴¹ Approximately 61 per cent of female partners were native-born, while 39 per cent immigrated from Western Europe and the Americas, AN, Junta Commercial, 1869–1904.

⁴² PI 9.203 & Patent 799, 1889. Merritt, 'Hypatia in the Patent Office', p. 255; and Stanley, *Mothers & Daughters of Invention*, pp. 298, 344.

PROTECTING THE RIGHT TO NEGOTIATE

While the political transition from Empire to Republic created new commercial laws designed to stimulate innovation, civil law on female property rights remained constant. Differing from Anglo-rule, Brazil's civil legislation largely classified property brought to or acquired under marriage as communal.⁴³ This legal arrangement is one of the main reasons why Maria Clémencia required her husband's permission to form her business partnership: to confirm his approval of their shared property invested into the firm. The practice was not reciprocal, as no wives were compelled by the Commercial Code to authorise their husband's business activity. Nevertheless, the law on communal property is also why Maria Clémencia could receive a patent for an invention originally registered by her husband. Under the marital property regime, both spouses legally laid claim to the bottling method. Her circumstances question if patents reflected the technological advance typically associated with market expansion or an effort to protect female rights to negotiate.

A key factor in female entrepreneurship in Brazil at the end of the nineteenth century was the protection of property rights granted by civil law. The same civil legislation governing property under marriage also determined its division upon death. Also unique from the legal customs prevalent in England and the United States, individuals had little say over the control of their estates. Brazil followed the civil law tradition of forced heirship, which divided family assets evenly among male and female relatives and largely omitted the possibility of testamentary freedom.⁴⁴ This

⁴³ *Ordenações* Livro 4, Título 46 and 47. With few exceptions, marital property was legally classified as communal. A prenuptial agreement allowed couples to maintain separate property in marriage. Similarly, with a *contrato de dote e arras*, a husband reserved the right to administer the property his wife brought to their marriage (the *dote* or dowry) but he could not claim ownership over her dowry. See Lauderdale Graham, 'Making the Private Public', p. 31 and Muriel Nazzari, *Disappearance of the Dowry: Women, Families, and Social Change in São Paulo, Brazil, 1600–1900* (Stanford, CA: Stanford University Press, 1991), p. 188, n. 14.

⁴⁴ In terms of its legal division, the family estate equalled three parts: two parts forcibly dedicated to their heirs and one part for the married couple to share evenly. Referred to as the *terça*, or the 'third', this latter portion enabled each spouse to freely distribute one-sixth of their conjugal property at the time of their death. *Ordenações*- Livro 4, Título 48; Borges, *The Family in Bahia, Brazil 1870–1945*, p. 115; Graham, 'Making the Private Public', pp. 30–31; Linda Lewin, *Surprise Heirs v. 1: Illegitimacy, Patrimonial Rights and Legal Nationalism in Luso-Brazilian Inheritance, 1750–1821* (Stanford, CA: Stanford University Press, 2002), p. 4 and Nazzari, 'Widows as Obstacles to Business', p. 781.

same legal emphasis on the family, over individual interests or bequests, is what entitled wives to certain rights during their marriage and into widowhood. Although communal property fell under the domain of the family patriarch, he was not the sole authority over the family estate.⁴⁵ The couple shared claims of all assets and neither spouse could mortgage or sell their holdings without consent of the other.⁴⁶ As a widow, Georgina Figueredo Reid joined her pharmacy in 1900 because she co-owned the capital her husband initially invested into the business. The civil law on family property guaranteed that her husband could neither control the pharmacy independently during their marriage nor freely will his share of the business upon his death. Although it is impossible to measure the percentage of female entrepreneurs who followed a similar path into the Brazilian market, at least one-third of businesswomen in Rio de Janeiro were widows.⁴⁷ Brazilian civil law firmly entrenched women in commerce and enabled them to strategically plot their business future.

Female entrepreneurship was not contingent on the strength of intellectual property laws by the Republican regime because women had long exercised substantial control of their property through the nation's civil laws. It is telling that Maria Clémencia was only one of eight female entrepreneurs who patented multiple inventions.⁴⁸ Instead, female entrepreneurs often used patent registration as a way to extend their space in a highly patriarchal market. Georgina Figueredo Reid's patent for 'London Pectoralis' coincided with the formation of a new partnership, forged with a male colleague, to run the pharmacy. This detail could be inconsequential, but, given the guarantees of property already inherit to civil law,

⁴⁵ *Ordenações*- Livro 4, Títulos 46–48 and Título 96; Lauderdale Graham, 'Making the Private Public', pp. 30–31; and Nazzari, *Disappearance of the Dowry*, p. 25. Several practices in nineteenth-century family law in Spanish Latin America also deferred control of communal property to the husband but the *patria potestad* was not legally sanctioned, as was the case for Brazil. See Carmen Diana Deere and Magdalena León, 'Liberalism and Married Women's Property Rights in Nineteenth-Century Latin America', *Hispanic American Historical Review* 85, no. 4 (2005): pp. 627–678, p. 647.

⁴⁶ *Ordenações*- Livro 4, Título 48.

⁴⁷ In addition to business women who self-identified as widows, either in their business partnership contracts or the name of their company, notarial and judicial records housed at the AN confirm that approximately 35 per cent of female partners and sole proprietors were widowed at the time they registered their businesses. AN, Junta Commercial, 1869–1904; *Habilitações para o casamento, 1880–1910* and *Inventários, 1870–1910*.

⁴⁸ Out of these eight women, one half patented distinct inventions whereas the other half represented versions of the original invention or technology. PI, 1880–1910.

patent activity presents an interesting lens of analysis for understanding female entrepreneurial strategy more broadly versus a technological contribution to market development.

CONCLUSION

Recognising patent applications as one of the many ways that women protected their space in the market in nineteenth-century Rio de Janeiro augments traditional conclusions on the role of female entrepreneurs and property rights in Brazilian economic development. Although a small collection of patent cases cannot offer definitive conclusions on the importance of female innovation for economic growth, they certainly highlight the multiple ways that women contributed to the expansion of technology in the market as envisioned by the imperial and Republican governments. Women are frequently viewed as rare but crucial capitalists, making contributions to family firms but not on their own account. Yet the research presented in this chapter of female entrepreneurs and their patent activity demonstrates how women often utilised their business acumen and legal savvy in pursuit of their own market endeavours.

Considered with the larger context of economic development, the business activity of patentees like Maria Clémencia also presents new conclusions on the significance of property rights, technology and gender. Buttressed by the commercial and civil legislation that provided women with a great degree of control over their market activity and personal property, there were few legal reasons for women to abstain from pursuing business or technological opportunities. The small numbers of patent applications, matching patterns in those nations with coverture, suggest that property rights were not the sole obstacle for female invention in the nineteenth century. Despite the legal protection of property for women in Brazil, they still operated in a patriarchal market in which female decorum was equally weighed with business strategy. The modest population of female patentees like Maria Clémencia emphasises the great efforts required for women to maintain their space in Brazil's gendered economy.

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