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11 UNITED STATES DISTRICT COURT
 12 NORTHERN DISTRICT OF CALIFORNIA
 13 SAN JOSE DIVISION

15 I.B., by and through his Guardian ad Litem
 16 GLYNNIS BOHANNON and J.W., by and
 through his Guardian ad Litem STEVEN
 17 WRIGHT, individually and on behalf of all
 others similarly situated,

18 Plaintiffs,

19 v.

20 FACEBOOK, INC.,

21 Defendant.

Case No. 12-CV-01894 BLF

**EXHIBIT O TO
 DECLARATION OF WHITTY
 SOMVICHIAN IN SUPPORT OF
 FACEBOOK, INC.'S OPPOSITION TO
 PLAINTIFFS' MOTION FOR CLASS
 CERTIFICATION**

Date: December 18, 2014
 Time: 9:00 a.m.
 Dept.: Courtroom 3 (5th Floor)
 Judge: Beth Labson Freeman

Trial Date: October 18, 2015

[REDACTED VERSION]

Exhibit O

(Expert Report of Ethan Cohen-Cole)

REDACTED VERSION OF DOCUMENTS SOUGHT TO BE SEALED

UNITED STATES DISTRICT COURT
NORTHERN DISTRICT OF CALIFORNIA
SAN JOSE DIVISION

I.B., by and through his Guardian ad Litem
GLYNNIS BOHANNON and J.W., by and
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others similarly situated,

Plaintiffs,

v.

FACEBOOK, INC.,

Defendant.

Case No. 12-CV-01894 BLF

Expert Report of Ethan Cohen-Cole, Ph.D.

October 16, 2014

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I. INTRODUCTION AND BACKGROUND

1. I have been retained by Cooley LLP, counsel for Facebook Inc. (“Facebook”), to offer my opinion as a payment systems expert in the above captioned matter. I am being compensated \$650 per hour for non-testimonial work in this matter, and \$875 per hour for testimonial work on this matter. Members of my staff are being compensated between \$275 to \$875 per hour for assisting me in my work on this matter.

2. Plaintiffs allege in their complaint that the California Family Code makes void any contract a teenager enters into using personal property not in his immediate possession or control. Plaintiffs argue that this alleged absence of control includes all payment instruments children can use on Facebook. In addition, they allege that a separate section of the Family Code allows teenagers to disaffirm contracts within a certain period of time.

3. Plaintiffs are currently seeking certification of a class and subclass. They seek certification of a class of all Facebook users who are or were minor children from March 8, 2008 until the date the class is certified (“Minor Class”) and a subclass of those who used Facebook Credits to make purchases (“Minor Purchasing Subclass”).

II. SUMMARY OF OPINIONS

4. Teenagers have a significant influence on the consumer goods market, spending over \$200 billion per year with an increasing number of transactions taking place by teenagers online.

5. Teenage users of Facebook can use a wide variety of payment methods to make in-game purchases, including credit cards, debit cards, PayPal, prepaid debit cards, gift cards, and mobile phone payment mechanisms.

6. For many of these payment instruments, teenagers can have complete or effective control over the funding source and the underlying funds. For example, teenagers can use a debit card linked to their own bank account, or their own gift card or prepaid debit card.

7. For many transactions, Facebook's data does not allow it to determine the specific type of payment instrument that a teenager used to make an in-game purchase.

8. Moreover, Facebook has no way of determining on a classwide basis what level of control each individual teenager has over the payment method or the underlying funds that the teenager uses. For example, even if it were possible to determine (using third-party sources or other individual methods) that a transaction involved a particular type of card, it is not possible based on Facebook's data to distinguish between a minor who has complete control over the payment instrument and a minor making an unauthorized transaction.

9. Even if Facebook were able to determine whether a teenager made an unauthorized purchase, the card agreement between the issuer and the parent may allow this transaction.

10. Plaintiffs ask the Court to enjoin Facebook to "allow a sale to a minor user only upon the manifestation of express and informed consent by the payment-vehicle owner." Plaintiffs imply (without stating directly) what some of their proposed injunctive provisions might be, but these proposals for injunctive relief are not possible or not practical to implement. Moreover, some of the proposals would not solve the problem of unauthorized use of parental payment instruments by teenage users.

III. QUALIFICATIONS

11. My name is Ethan Cohen-Cole. I am a Managing Director at EconOne Research, a company that provides financial and economic consulting services.

12. I was previously a professor in the Department of Finance at the University of Maryland, College Park's Robert H. Smith School of Business. In addition, I served as a faculty

participant at the Center for Financial Policy and on the steering committee of the Center for Social Value Creation. I taught courses on a range of topics including financial institution management, corporate finance, and banking.

13. Before teaching, I was a financial economist in the Supervision and Regulation function of the U.S. Federal Reserve System (“Federal Reserve”), where I provided technical and analytical direction to bank supervisors for many of the largest banks in the United States.

14. Over the span of my career, I have worked in the banking sector providing financial services to a wide range of institutions including the Federal Reserve, the World Bank, and the Bank for International Settlements. I have also worked as a technical risk management consultant, where I oversaw the construction of a new credit card scoring system for commercial lending. I also performed due diligence on mid-market and retail companies for investment clients.

15. I have experience evaluating the use, regulations and customs relating to consumer financial products. I provided technical support and oversight for a large-scale survey of financial product usage for the New York Department of Consumer Affairs. In my role as a testifying expert, I submitted an expert report in connection with credit card processing contracts and U.S. consumer payment systems. I have also testified on a matter concerning the prepaid debit card industry.

16. As an academic at the University of Maryland, my research covered topics such as credit card decision-making, social network effects, and financial markets. In this role, I published papers on numerous financial topics including consumer credit, consumer protection and the interbank market. During this time, I also served as a steering committee member for the Center for Financial Policy at the University of Maryland.

17. I have published widely in economics and finance journals, including the Review of Economics and Statistics, the Journal of Macroeconomics, the American Law and Economic Review, the Journal of Health Economics, Economic Inquiry, Economics Letters and Applied Economics. I have also served as a referee for more than 20 academic journals, including the Review of Financial Studies, the Quarterly Journal of Economics, the American Economic Review, the Journal of Monetary Economics, the Review of Economic Studies, the Review of Economics and Statistics, American Economic Journal – Economic Policy, Journal of Financial Intermediation, Journal of Money Credit and Banking, Journal of Banking and Finance and the Journal of Financial Services Research.

18. I have been an invited visitor or speaker at more than 175 professional and academic seminars and training sessions. I have been a visiting scholar or professor at the University of California, Berkeley, the European Central Bank, the Bank of France and the Federal Deposit Insurance Corporation's Center for Financial Research. I have received scholarly research grants from the National Science Foundation, the National Institutes of Health, the National Institute of Justice, the Department of Education, the European Central Bank and the MacArthur Foundation.

19. I have included a recent CV as **Appendix A**, which includes more detail on the above. My CV includes all of my publications for the last ten years and all of my expert witness testimony for the last four years. For a list of Documents Relied Upon, please reference **Appendix B**.

20. I am being paid \$650/hour for non-testimonial work related to this case and \$875/hour for testimonial work. My compensation is not contingent upon my findings or the

outcome of this matter. I reserve the right to modify, amend, or supplement my analysis if additional information becomes available to me.

IV. ONLINE PURCHASES: PAYMENT METHODS AND PROCESSING

A. Payment Methods for Online Purchases

21. As more transactions take place via the Internet, there has been a rapid rise in the use of credit and debit cards as payment instruments. In addition, several new payment instruments have emerged, including prepaid cards available as physical cards or virtual “cards”; gift cards; and cards that can be reloaded. This section outlines some of these forms of payment.

Credit Cards

22. Credit cards provide cardholders the ability to acquire an item immediately and pay for the item with future earnings.¹ Credit cards, usually branded with the logo of one of the four major U.S. credit card brands, Visa, MasterCard, American Express or Discover, display a unique 15 or 16 digit card number (“16 digit number”),² card expiration date and card identification number.^{3,4} See **Exhibit 1: Key Features of 16 Digit Credit/Debit Cards** and **Exhibit 2: Key Features of 15 Digit American Express Cards** for a detailed explanation of features of physical credit cards. Visa and MasterCard credit cards, in particular, contain a 6 digit prefix known as a

¹Jabaily, Bob, ed. “Credit History: The Evolution of Consumer Credit in America.” The Ledger, Federal Reserve Bank of Boston’s Economic Education Newsletter (2004): 3-9.

²In this report, I generically refer to card length as 16 digits, which is the length of an account number for cards on the Visa, MasterCard, or Discover networks. American Express cards have 15 digit account numbers. Other issuers may have account numbers varying in length from 12 to 19. For a discussion of the numbering conventions used, see McClary, Bruce. “Credit Card Numbers - What Do They Mean? A look at What’s Inside Your Credit Card.” ClearPoint Credit Counseling Solutions, 11 Apr. 2013.

<<http://www.clearpointcreditcounselingsolutions.org/what-do-credit-card-numbers-mean-a-look-at-whats-inside-your-credit-card/>> (accessed 23 Sept. 2014); and Simon, Jeremy M. “What are those numbers on my credit card?” Creditcards.com, 6 Sept. 2006. <<http://www.creditcards.com/credit-card-news/credit-card-appearance-1268.php>> (accessed 7 Oct. 2014).

³The card identification number (“CIN”) is also referred to as card verification number (“CVN”), card verification value (“CVV” or “CVV2”), or card verification code (“CVC2”).

⁴McClary, Bruce. “Credit Card Numbers - What Do They Mean? A Look at What’s Inside Your Credit Card.” ClearPoint Credit Counseling Solutions, 11 Apr. 2013.

<<http://www.clearpointcreditcounselingsolutions.org/what-do-credit-card-numbers-mean-a-look-at-whats-inside-your-credit-card/>> (accessed 23 Sept. 2014).

Bank Identification Number (“BIN”), which is coded to identify, among other details, a card’s issuer.⁵ Teenagers can typically cannot open their own accounts but they may be added as authorized users to a credit card account where an adult is the primary account holder. Authorized users do not need to be account holders, and card agreements generally do not place age restrictions on authorized users.^{6, 7}

Debit Cards

23. Debit card transactions resemble credit card transactions but are unique in that they allow bank account holders to access the funds in their accounts to immediately make withdrawals to pay for goods or services.⁸ Currently within the United States, debit cards are the most frequently used non-cash method for making retail purchases.⁹ Debit cards resemble credit cards in appearance and often bear the logo of a major credit card network.¹⁰ For examples of debit cards, see **Exhibit 1: Key Features of 16 Digit Credit/Debit Cards**. Generally, there is nothing restricting a parent from naming a teenager as an authorized user for his or her debit card.¹¹

⁵In this report, I use the term BINs. BINs however are also referred to as Issuer Identification Numbers (“IINs”). The terms BIN and IIN are used interchangeably. Griffin, Gay. “Re: ISO Register of Card Issuer Identification Number.” Message to Kyle See. 9 Oct. 2014. Generally, BINs and IINs form the first part of the primary account number and identify the major industry and the card issuer. See **Exhibit 1: Key Features of 16 Digit Credit/Debit Cards** for an example.

⁶See, for example, “MasterCard Guide to Benefits for Credit Cardholders.” MasterCard, 1 Jan. 2014. PDF File. <<http://www.mastercard.com/credit-gtb/pdf/Core-Credit-GTB-6-10-13.pdf>>, at 4.

⁷“Add an Authorized User.” Discover. <<https://www.discover.com/credit-cards/help-center/account/authorized-users.html>> (accessed 6 Oct. 2014); and “Cardmember Agreement.” American Express, 30 June 2014. PDF File. <<https://web.aexp-static.com/us/content/pdf/cardmember-agreements/blue/BlueAECB.pdf>> (accessed 6 Oct. 2014), at 3. (“At your request, we may issue cards to Additional Cardmembers. They do not have accounts with us but they can use your Account subject to the terms of this agreement.”).

⁸“Using Debit Cards.” *Consumer.gov*. Federal Trade Commission. <<http://www.consumer.gov/articles/1004-using-debit-cards>> (accessed 4 Oct. 2014).

⁹Bennett, Barbara, Douglas Conover, Shaun O’Brien, and Ross Advincula. “Cash Continues to Play a Key Role in Consumer Spending: Evidence from the *Diary of Consumer Payment Choice*.” Federal Reserve System Cash Product Office, Apr. 2014, at 3.

¹⁰“Using Debit Cards.” *Consumer.gov*. Federal Trade Commission. <<http://www.consumer.gov/articles/1004-using-debit-cards>> (accessed 4 Oct. 2014); see also “PIN Based Debit.” PayGov.US. <<http://paygov.us/our-services/pin-based-debit/>> (accessed 9 Oct. 2014).

¹¹See for example “MasterCard Guide to Benefits for Debit Cardholders.” MasterCard, 1 Jan. 2014. PDF File. <<http://www.mastercard.us/guide-to-benefits-2014/pdf/debit-gtb.pdf>>, at 2.

24. Today, debit card transactions can be distinguished as either “on-line” or “off-line” transactions.¹² In-person transactions that require the customer to enter a personal identification number (“PIN”) are called on-line debit transactions.¹³ The transaction amount is automatically deducted from the customer’s bank account.¹⁴ In off-line transactions, the customer is required to provide a signature at the point of sale rather than enter a PIN.¹⁵ These off-line signature-based transactions were introduced by the Visa and MasterCard networks and these transactions are processed through their credit card networks.¹⁶ Off-line debit transactions requiring a signature are the most common type of debit transaction.¹⁷ For debit transactions made over the Internet, the debit card user is not required to enter a PIN or provide a signature before completing the purchase.

Prepaid Cards

25. Prepaid cards resemble debit and credit cards but are not linked to a bank account¹⁸ and do not require a user to undergo a credit check prior to issuance. When a purchase is made using a prepaid card, the transaction amount is reduced from the card’s available balance.¹⁹ Because of this feature, prepaid cards are sometimes called debit cards. Prepaid cards are issued in a variety of different ways and may be reloadable or nonreloadable, and either physical or

¹²Weiner, Stuart E. “Electronic Payments in the U.S. Economy: An Overview.” *Economic Review*, Federal Reserve Bank of Kansas City, 1999, at 5.

¹³*Id.*

¹⁴*Id.*

¹⁵*Id.*

¹⁶*Id.*

¹⁷“PIN Based Debit Transactions!” PayGov.us. <<http://paygov.us/our-services/pin-based-debit/>> (accessed 7 Oct. 2014).

¹⁸Federal Reserve Bank of St. Louis. “Cards, Cards and More Cards: The Evolution to Prepaid Cards.” *Inside the Vault* 16 (Fall 2011): 1-4, 6.

¹⁹“Prepaid Cards What is a prepaid card?” Consumer Financial Protection Bureau, 18 May 2014. <<http://www.consumerfinance.gov/askcfpb/379/what-prepaid-card.html>> (accessed 15 Oct. 2014).

virtual.^{20, 21} The card's initial value may be established prior to the card's issuance or determined at the time of the card's purchase by the buyer.^{22, 23} Prepaid cards are processed using major credit card networks²⁴ but vary in function and in degree of potential control for a teenager.

Nonreloadable Prepaid Cards

26. Nonreloadable prepaid cards do not allow cardholders to increase the value stored on the card.²⁵ Nonreloadable prepaid cards have a 16 digit number and expiration date similar to the design of a traditional credit card. See **Exhibit 3: Credit: Nonreloadable Prepaid Card** for an illustration of a nonreloadable prepaid card. Nonreloadable prepaid cards can be purchased at retail locations;²⁶ to make such a purchase, a teenager is not required to get parental authorization.

Reloadable Prepaid Cards

27. Some prepaid cards are reloadable, meaning that the value stored on the card may be increased by the cardholder.²⁷ Cardholders may reload value onto a reloadable prepaid card at a retail location or via electronic funds transfer (*e.g.*, direct deposit or other bank transfer).²⁸ Like traditional credit cards, reloadable prepaid cards display a 16 digit number and an expiration date

²⁰“Merchant Processing.” *Comptroller’s Handbook*. Office of the Comptroller of the Currency, Aug. 2014. PDF File. <<http://www.occ.gov/publications/publications-by-type/comptrollers-handbook/pub-ch-merchant-processing.pdf>>, at 6.

²¹For an example of a virtual prepaid card, see “EntroPay Makes Life Online Easier.” EntroPay. <<https://www.entropay.com/using-entropay>> (accessed 6 Oct. 2014).

²²“Prepaid Cards.” *Consumer.gov*. Federal Trade Commission. <<http://www.consumer.gov/articles/1005-prepaid-cards>> (accessed 10 Oct. 2014).

²³“Which Vanilla Are You?” *OneVanilla*. InComm. <<https://www.onevanilla.com/onevanilla/about.html>> (accessed 19 Sept. 2014).

²⁴French, Tramond, Stanley Sienkiewicz, and Chris Daniel. “Prepaid Cards.” *ABA Bank Compliance* (Nov.-Dec. 2007): 12-15, at 12.

²⁵“Merchant Processing.” *Comptroller’s Handbook*. Office of the Comptroller of the Currency, Aug. 2014. PDF File. <<http://www.occ.gov/publications/publications-by-type/comptrollers-handbook/pub-ch-merchant-processing.pdf>>, at 6.

²⁶“Where to buy a OneVanilla Card.” *OneVanilla*. InComm. <<https://www.onevanilla.com/onevanilla/stores.html?csrfToken=Uh0GSBaGdOfXW26JOXbh00OCgv6ooILd>> (accessed 14 Oct. 2014).

²⁷Wilshusen, Stephanie M., Robert M. Hunt, and James van Opstal. *Consumers’ Use of Prepaid Cards: A Transaction-Based Analysis*. Aug. 2012, at 3.

²⁸*Id.*

similar in design to a traditional credit card.²⁹ See **Exhibit 4: Credit: Reloadable Prepaid Card** for an illustration of a reloadable prepaid card. Reloadable prepaid cards can be purchased at retail locations³⁰ by teenagers under the age of 18 without parental authorization.

Gift Cards

28. Gift cards have become a popular form of gifting due to the control that the gift recipient has to redeem the value at her discretion. Nearly 50% of Americans in a 2012 survey responded that they planned to give gift cards during the 2012 holiday season,³¹ and gift cards have been the most requested gift since 2008.³² Further, 98% of teenagers have either bought or received gift cards.³³ There are two types of gift cards: network-branded gift cards and merchant-issued gift cards.

Network-Branded Gift Cards

29. Network-branded gift cards are a type of what are called “open-loop” gift cards, which are issued by banks within an associated network.³⁴ Holders of network-branded gift cards can redeem the card’s value at any merchant where the associated credit card brand is accepted.³⁵ Network-branded gift cards have a 16 digit number that resembles the numbers on a traditional

²⁹“Prepaid Cards Fact Sheet.” MasterCard. PDF File.

<http://www.mastercard.com/ca/wce/PDF/14919_Prepaid_Cards_Fact_Sheet_Oct_19.pdf>, at 1.

³⁰“Find a prepaid card.” Visa. <<http://usa.visa.com/locators/get-a-card.jsp>> (accessed 7 Oct. 2014); and “Where to buy a MyVanilla Card.” *MyVanilla*. InComm.

<<https://www.myvanilladebitcard.com/myvanilla/buyinstore.html?csrfToken=lpHr5bviuhhRcQnuRBhZyCqoP2b1JRvF>> (accessed 15 Oct. 2014).

³¹Jones, David S. “Holiday Gift Card Spending Report.” GiftCard.com, 2012, at 8.

³²“Gift Card Statistics.” GRI Financial Services, Inc. <<http://grifinancial.com/id154.html>> (accessed 9 Oct. 2014).

³³*Id.*

³⁴“Merchant Processing.” *Comptroller’s Handbook*. Office of the Comptroller of the Currency, Aug. 2014. PDF File. <<http://www.occ.gov/publications/publications-by-type/comptrollers-handbook/pub-ch-merchant-processing.pdf>>, at 6.

³⁵*Id.*

credit card as well as an expiration date.³⁶ See **Exhibit 5: Credit: Network-Branded Gift Card** for an example.

Merchant-Issued Gift Cards

30. Retailers may also issue what are known as “closed-loop” cards for sale or as a mechanism for crediting returned purchases.³⁷ Unlike network-branded gift cards, such closed-loop cards may only be redeemed with the merchant that issued them.³⁸ Facebook, for example, has issued gift cards, which are available for purchase at retailers like Target, and are only redeemable on Facebook.³⁹ See **Exhibit 6: Gift Card: Redeeming a Facebook Game Card** for an example of a Facebook closed-loop card.

Virtual Prepaid Cards

31. Virtual prepaid “cards” offer similar features to a physical prepaid card but are generally only generated and used in electronic format.⁴⁰ Similar to a physical prepaid card, a virtual card’s initial available balance is determined at the time of the card’s purchase by the buyer.⁴¹

³⁶“Prepaid Cards Fact Sheet.” MasterCard. PDF File.

<http://www.mastercard.com/ca/wce/PDF/14919_Prepaid_Cards_Fact_Sheet_Oct_19.pdf>, at 2.

³⁷See refund policy example of major retailer Macy’s: “Need more information about our return policy?” Macy’s. <https://customerservice.macys.com/app/answers/detail/a_id/140/~/need-more-information-about-our-return-policy%3F> (accessed 2 Oct. 2014).

³⁸“Merchant Processing.” *Comptroller’s Handbook*. Office of the Comptroller of the Currency, Aug. 2014. PDF File. <<http://www.occ.gov/publications/publications-by-type/comptrollers-handbook/pub-ch-merchant-processing.pdf>>, at 6.

³⁹“Facebook Game Cards.” *App Center*. Facebook. <https://www.facebook.com/FacebookApps?sk=app_154977384515365&app_data=facebook%7C%7C> (accessed 3 Oct. 2014).

⁴⁰“EntroPay Makes Life Online Easier.” EntroPay. <<https://www.entropay.com/using-entropay>> (accessed 6 Oct. 2014).

⁴¹“EntroPay ‘Top Five’ Advantages.” EntroPay. <<https://www.entropay.com/entropay-top-five-advantages>> (accessed 6 Oct. 2014).

“Masked” Virtual Prepaid Fixed-Amount Cards

32. A masked card is a virtual prepaid fixed-amount card⁴² that is designed to allow a user to conduct a transaction without giving a merchant personal identifying information.⁴³ To obtain a masked card, a user first sets up an online account with a masked provider that is linked to a user’s actual credit card or a user’s bank account.⁴⁴ Next, the user selects the value that will be available on the card for future purchases.⁴⁵ A masked card is then issued for that amount.⁴⁶ See **Exhibit 7: Credit: Create a Masked Card** for an illustration of how a masked card is obtained. The masked card consists of a randomly generated 16 digit card number, expiration date, and card identification number that can be used online.⁴⁷ The address associated with the transaction is that of the masked card provider and not the purchaser.⁴⁸ Teenagers are unable to make authorized purchases of masked cards, because the cardholder agreement for such cards stipulates that users must be 18 years or older.⁴⁹

Virtual Prepaid Reloadable Cards

33. Sometimes called virtual debit cards, virtual prepaid reloadable cards allow cardholders to increase a card’s account balance after issue.⁵⁰ Generally, virtual prepaid reloadable cards have a 16 digit number similar in design to a traditional credit card. See **Exhibit 8: Credit:**

⁴²Masked cards are sometimes referred to as “virtual one-time use” cards.

⁴³“Masked Cards in 30 Seconds.” Abine. <<https://www.abine.com/maskme/features/cards/>> (accessed 7 Oct. 2014).

⁴⁴*Id.*

⁴⁵*Id.*

⁴⁶*Id.*

⁴⁷Peterson, Hayley. “How to Use a ‘Fake’ Credit Card to Protect Yourself from Hackers.” Business Insider, 14 Jan. 2014 <<http://www.businessinsider.com/abine-maskme-protects-against-hackers-2014-1>> (accessed 6 Oct. 2014).

⁴⁸Tanner, Adam. “Why You Should Use a Masked Credit Card to Shop Online.” Forbes, 4 Dec. 2013. <<http://www.forbes.com/sites/adamtanner/2013/12/04/why-you-should-use-a-masked-credit-card-to-shop-online/>> (accessed 6 Oct. 2014).

⁴⁹“Privacy Policy.” Legal. Abine, 1 May 2014 <<http://abine.com/legal.html>> (accessed 7 Oct. 2014).

⁵⁰Wilshusen, Stephanie M., Robert M. Hunt, and James van Opstal. “Consumers’ use of prepaid cards: A transaction-based analysis.” Center for Financial Services Innovation, Federal Reserve Bank of Philadelphia (2012), at 3.

Minor Specific Virtual Visa Debit Card for an illustration of a prepaid reloadable card marketed to minors, where parents can set daily spending limits for children. See also **Exhibit 9: Credit: Virtual Reloadable Prepaid Card**. Generally, virtual prepaid reloadable cards cannot be purchased on online websites by users under 18.⁵¹

Virtual Network-Branded Gift Cards

34. Open-loop gift cards available only in electronic form are known as virtual network-branded gift cards.⁵² Virtual network-branded gift cards can be redeemed anywhere the associated credit card brand is accepted.⁵³ There is no name on the card. Network branded gift cards have a 16 digit number that resembles the numbers on a traditional credit card. Many card agreements do not require that a person be over the age of 18 to purchase or use them.

A. Processing of Online Purchases

35. Internet purchases using a debit card, credit card or gift card, are called card-not-present (“CNP”) transactions.⁵⁴ An online merchant has limited ability to directly verify the identity of the consumer; rather, it is responsible for collecting certain payment information and routing it through the credit card network for authorization.⁵⁵

⁵¹“General Terms of Use & Legal Policy.” GiftCards.com. <<http://www.giftcards.com/legal>> (accessed 7 Oct. 2014).

⁵²“Merchant Processing.” *Comptroller’s Handbook*. Office of the Comptroller of the Currency, Aug. 2014. PDF File. <<http://www.occ.gov/publications/publications-by-type/comptrollers-handbook/pub-ch-merchant-processing.pdf>>, at 6.

⁵³“Virtual Gift Cards.” GiftCards.com. <<https://www.giftcards.com/virtual-gift-cards>> (accessed 19 Sept. 2014).

⁵⁴“Card Not Present.” Visa. <<http://usa.visa.com/merchants/protect-your-business/fraud-control/card-not-present.jsp>> (accessed 3 Oct. 2014).

⁵⁵See “Card Acceptance Guidelines for Visa Merchants.” Visa. PDF File. <<http://usa.visa.com/download/merchants/card-acceptance-guidelines-for-visa-merchants.pdf>>, at 42; “Transaction Processing Rules.” MasterCard, 15 May 2014. PDF File. <http://www.mastercard.com/us/merchant/pdf/TPR-Entire_Manual_public.pdf>, at 3-2; and “American Express Merchant Reference Guide - U.S.” American Express, Oct. 2014. PDF File. <https://www209.americanexpress.com/merchant/singlevoice/singlevoiceflash/USEng/pdffiles/MerchantPolicyPDFs/US_%20RefGuide.pdf>, at 23.

36. Transactions nonetheless go through a payment authorization process, which in a credit card transaction involves the merchant transmitting the cardholder's credit card number and expiration date plus the purchase amount through the payment processing network to determine if the transaction is authorized.^{56, 57} For CNP transactions, merchants are also increasingly encouraged to collect and include in authentication the card verification value ("CVV2") number.⁵⁸

37. My understanding is that for an initial purchase, Facebook collects account number, zip code, expiration date, and CVV2 or CVC2.⁵⁹ For subsequent charges, Facebook collects the Facebook user's account number, zip code and expiration date.⁶⁰ A typical process for a merchant that retains card information for future purchases is to save the card number in an encrypted format in a portion of the merchant's computer network that is inaccessible to internal employees. This inaccessible area is often the only portion of the company network that connects to the transaction processor.

38. To expedite the transaction and verification processes for subsequent purchases, it is not uncommon for CNP merchants to store payment instrument data. **Appendix C: Industry**

⁵⁶*E.g.*, Visa and MasterCard use this authorization process for their credit or debit card transactions. See "Card Acceptance Guidelines for Visa Merchants." Visa. PDF File.

<<http://usa.visa.com/download/merchants/card-acceptance-guidelines-for-visa-merchants.pdf>>, at 6.

⁵⁷Addresses until recently were not authenticated. Card networks now provide some tools for address verification. *E.g.* Visa has an Address Verification Service (AVS) that provides a parallel but separate system to check whether addresses provided match billing address. Because addresses are difficult to match exactly, issuers return a wide range of codes to indicate matches and near matches. It remains at merchant discretion to evaluate risk. Address verification is a separate paid service. "Merchant Guide to the Visa Address Verification Service." Visa. PDF File.

<https://www08.wellsfargomedia.com/downloads/pdf/biz/merchant/visa_avs.pdf>, at 6-7.

⁵⁸"Global Visa Card-Not-Present Merchant Guide to Greater Fraud Control." Visa, 2011. PDF.

<<http://usa.visa.com/download/merchants/global-visa-card-not-present-merchant-guide-to-greater-fraud-control.pdf>>, at 2-3.

⁵⁹Chernyavsky, Michelle. "Facebook Payments." Message to Ethan Cohen-Cole. 15 Oct. 2014. E-mail. ("Facebook collects the user's account number, expiration date, zip code, and Card Verification Value as part of its initial authentication process for credit and debit cards."),

⁶⁰Chernyavsky, Michelle. "Facebook Payments." Message to Ethan Cohen-Cole. 15 Oct. 2014. E-mail. ("Facebook collects the user's account number, expiration date, zip code as part of its authentication process for subsequent charges.").

Standard Provisions: Payment Storage Details highlights a number of merchants similarly situated to Facebook who store payment instrument details of their users.

V. \$200 BILLION⁶¹ WORTH OF GOODS ARE PURCHASED BY OR FOR TEENAGERS EACH YEAR.

39. The growth in Internet payments coincided with the emergence of online merchants like eBay and Amazon, which offer consumers the opportunity to shop for goods without traveling to a physical retail location.

40. The rise in the use of the Internet and e-commerce⁶² has been rapid and has had a large impact on consumer payments.⁶³ Teenagers have readily adopted e-commerce and make a large number of their purchases online. 76% of teenage females and 86% of teenage males surveyed in the spring of 2014 stated that they shop online.⁶⁴

41. In order to support their spending, teenagers have personal access to between \$2,000 and \$4,000 annually.⁶⁵ Of this amount, 66-70% is provided to teenagers by their parents.⁶⁶ Parents provide this income in the form of allowances and gifts – some portion or all of which typically can be spent at the discretion of the teenager. To supplement allowance income, aggregate earnings from employment for teenagers is about \$44 billion per year.⁶⁷ Employment opportunities for teenagers generally involve babysitting, yard work, working at a restaurant or retail store, and tutoring. *See Exhibit 11a: Sources of Income for Teens* and *Exhibit 11b: How Teens Earn Money* for further details on teenager income.

⁶¹Passy, Charles. “Baby, Baby: Prepaid Debit Cards No Cause for Teens to Scream.” *The Wall Street Journal*, 15 Jan. 2013. <<http://online.wsj.com/news/articles/SB10001424127887323596204578241984027206580>> (accessed 6 Oct. 2014).

⁶²*See Exhibit 10: Growth in E-commerce, 1Q2000-1Q2014* for an illustration.

⁶³“Card Acceptance Guidelines for Visa Merchants.” Visa. PDF File. <<http://usa.visa.com/download/merchants/card-acceptance-guidelines-for-visa-merchants.pdf>>, at 41.

⁶⁴“Taking Stock with Teens.” Piper Jaffray, Spring 2014. PDF File. <http://www.piperjaffray.com/private/pdf/Taking_Stock_Teach-In_Spring_2014.pdf>, at 32.

⁶⁵“The Teens Market in the U.S.” Packaged Facts, 2007, at 3.

⁶⁶“Taking Stock with Teens.” Piper Jaffray, Fall 2014. PDF file. <<http://www.piperjaffray.com/private/pdf/tswt-fall14-pres.pdf>>, at 13.

⁶⁷“The Teens Market in the U.S.” Packaged Facts, 2007, at 15.

VI. CONTROL OVER FUNDS: FROM CASH TO MODERN PAYMENT INSTRUMENTS

42. As payment systems have evolved to embrace more cashless, automated transactions, many of which now occur online, each step has loosened physical connections to funding and obscured who has “control” over the assets used to make a purchase. Indeed, control and responsibility for payment is typically governed by contracts between individuals and payment service providers, such as credit card issuers. The terms of these contracts are not known to merchants or included in authentication protocols. Consequently, merchants are typically unable to identify who controls the relevant assets.

43. Historically, cash was the primary vehicle for making purchases, which occurred at the physical location of a merchant. In a transaction involving cash, the holder of the cash is perceived to have the authority to make the purchase, as well as possession and control over the payment method. While having access to cash and conducting transactions entirely in cash was once commonplace, alternative payment methods continue to evolve beyond cash.⁶⁸

44. One advancement beyond cash is the check.⁶⁹ Payments made from a checking account traditionally were done using physical checks that generally require two signatures,⁷⁰ one from the person who writes the check, the other from the payee, who endorses the check to authorize the payment of cash.⁷¹ When accepting a physical check as a form of payment in a retail location, merchants can request proof of identification in the form of a state-issued identification

⁶⁸It is reported that there was an estimated 9.4% global growth in non-cash transactions between 2012 and 2013 globally. North America saw an estimated 4.9% growth. *See* Capgemini and RBS Group. “World Payments Report 2014.” Capgemini Financial Services Analysis, 2014, at 15.

⁶⁹A check is a written order from a bank account owner to the bank that provides direction to make a specified payment to a third party payee by deducting funds from the account balance of the account holder. On the evolution of checks *see*, Quinn, Steven, and William Roberds. “The Evolution of the Check as a Means of Payment: A Historical Survey.” *Economic Review* 93. Federal Reserve Bank of Atlanta (2008), at 2.

⁷⁰In the case of “For Deposit Only” transactions, the signature for the check casher is not required.

⁷¹Quinn, Steven, and William Roberds. “The Evolution of the Check as a Means of Payment: A Historical Survey.” *Economic Review* 93. Federal Reserve Bank of Atlanta (2008), at 2.

card for signature verification.⁷² Thus, while not as definitive as cash, using a check implies control over an account, and laws provide for criminal penalties for attempting to issue checks without authorization.^{73, 74, 75}

45. Credit cards first came into use in 1951,⁷⁶ and became more popular over the following decades.⁷⁷ Credit cards enabled customers to make cashless purchases based on their promise to pay back the issuer at a later date and maintain a revolving balance subject to finance charges.⁷⁸ A crucial turning point leading to the widespread adoption of credit cards occurred in the early 1980s when Visa introduced the first electronic hardware terminals, which enabled processing at the point of sale.⁷⁹ Merchants accepting credit card transactions at the point of sale generally verify the cardholder's identity by requiring either a valid handwritten signature or a government issued identification card.⁸⁰ Although this form of payment was less personalized than other transactions, generally the identity of the individual at the point of sale could still be verified by a merchant.

⁷²“Accepting Checks.” The U.S. Small Business Administration. <<http://www.sba.gov/content/accepting-checks>> (accessed 4 Oct. 2014).

⁷³Cal. Penal Code § 470 (a)(b).

⁷⁴Cal. Penal Code § 476.

⁷⁵Recently, electronic methods have emerged that allow individuals to use bank account and routing information to make purchases with funds from their checking accounts without using a physical check. *See* for example “Electronic Check Processing.” *Chase Paymentech*. Chase Paymentech Solutions, 2014. <https://www.chasepaymentech.com/electronic_check_processing.html> (accessed 3 Oct. 2014) (An echeck “directly debits consumers’ bank accounts for payment of goods or services.”).

⁷⁶“History of the Card Payments System.” MasterCard. PDF File. <http://www.mastercard.com/us/company/en/docs/History_%20of_payments.pdf>, at 1.

⁷⁷*Id.*

⁷⁸Jabaily, Bob, ed. “Credit History: The Evolution of Consumer Credit in America.” *The Ledger*, Federal Reserve Bank of Boston’s Economic Education Newsletter (2004): 3-9.

⁷⁹Sienkiewicz, Stanley. “The Evolution of EFT Networks from ATMs to New On-Line Debit Payment Products.” *Federal Reserve Bank of Philadelphia*, Apr. 2002, at 5-6.

⁸⁰*See* “Learn how to process Card payments.” American Express. <https://web.archive.org/web/20000126165108/http://home5.americanexpress.com/merchant/learn/learn_default.asp?learn_body=process_body> (archived 26 Jan. 2000); “Merchant Best Practices.” Visa. <<https://web.archive.org/web/19991013062922/http://visa.com/fb/merch/practice/main.html>> (accessed 13 Oct. 1999); and “Fraud Prevention Tips/Seminars.” Discover. <https://web.archive.org/web/20010417041531/http://www.novusnet.com/merchant/data/merch_fraud.htm> (archived 29 Feb. 2000).

46. Debit card technology was also developed in the late 1960s.⁸¹ Having a debit card in hand and knowledge of the unique PIN associated with the card allows a user to demonstrate his control over the associated checking account.⁸² A key feature here is that merchants can rely on the knowledge of the PIN rather than needing to check the identity of the user of the card.⁸³

47. Gift cards were first popularized by retailers such as Blockbuster and Neiman Marcus during the mid-1990s.^{84, 85} While gift cards can be processed electronically over credit card networks, in many ways, they bear a similarity to cash. They have a fixed value, and are in general transferrable. Thus, like cash, the holder of a gift card is assumed to have control over those funds.

VII. A WIDE VARIETY OF PAYMENT INSTRUMENTS WERE AVAILABLE AND CONTINUE TO BE AVAILABLE TO USE ON FACEBOOK.

48. While Facebook supports over 80 different payment instruments around the world,⁸⁶ I have focused on the United States where Facebook categorizes payment instruments broadly as Credit, PayPal, Mobile, and Alternative Pay (“Alt Pay”).⁸⁷ See **Exhibit 12: Facebook**

⁸¹Hayashi, Fumiko, Richard James Sullivan, and Stuart Earl Weiner. “A Guide to the ATM and Debit Card Industry.” Payments System Research Department, Federal Reserve Bank of Kansas City, 2003, at 13.

⁸²“Using Debit Cards.” *Consumer.gov*. Federal Trade Commission. <<http://www.consumer.gov/articles/1004-using-debit-cards>> (accessed 4 Oct. 2014). See also, Hayashi, Fumiko, Richard James Sullivan, and Stuart Earl Weiner. “A Guide to the ATM and Debit Card Industry.” Payments System Research Department, Federal Reserve Bank of Kansas City, 2003, at 88.

⁸³*Id.*

⁸⁴Desch, T. Stuart, and Kiran Krishnamurthy. “The Growth of Paperless Money: Retail Payments in the United States Continue to Evolve.” *Economic Brief*. Federal Reserve Bank of Richmond, June 2009, at 2.

⁸⁵Orange County Register. “Prepaid cards are more than just talk Movie theaters, fast-food chains may be next to sell them.” *The Baltimore Sun*, 20 June 1997. <http://articles.baltimoresun.com/1997-06-30/business/1997181005_1_prepaid-cards-telephone-cards-cards-are-coming> (accessed 3 Oct. 2014).

⁸⁶“What payment methods can I use?” Facebook. <<https://www.facebook.com/help/203680236341574>> (accessed 30 Sept. 2014).

⁸⁷Currently, the only Alt Pay payment instrument accepted by Facebook is Oink. Chernyavsky, Michelle. “Facebook Payments.” Message to Ethan Cohen-Cole. 15 Oct. 2014. E-mail. (“Facebook’s major payment types are categorized as Credit Card, PayPal, and Mobile. The only alternative payment method it currently accepts is Oink. Facebook is unable to reconstruct the full transaction data for alternative payment methods.”). Alt Pay has historically included basic payment instruments such as bank transfers, as well as more innovative payment instruments including DaoPay and Western Union. See Chernyavsky, Michelle. Conversation with Ethan Cohen-Cole. 6 Oct. 2014. For the purpose of this report, I limit my comments to Credit, PayPal and Mobile.

Pay Dialog. **Exhibit 13: Transactions by Type** shows the number of transactions taking place in each category from the period between February 2008 to June 2014.

Most Payment Cards Are Processed as Credit Transactions

49. The majority of the transactions on Facebook are processed through the credit card networks, whether or not they involve an actual credit card. Included within this group are debit cards, prepaid cards, virtual prepaid cards,⁸⁸ and open-loop gift cards⁸⁹ (in contrast to Facebook-issued closed-loop gift cards, discussed below).

PayPal as a Payment Instrument

50. PayPal is an Internet financial services company that allows its registered users to pay for purchases using funds available in the user's PayPal balance.⁹⁰ PayPal allows users to link a variety of payment instruments to a PayPal account, which can then be used to increase the PayPal balance, fund transactions, or fund transfers to other users.⁹¹ The various payment instruments that can be linked to a PayPal account can include: credit card,⁹² debit card,⁹³ and PayPal Credit.⁹⁴ A bank account can be used to fund a PayPal balance by transferring funds from a

⁸⁸For an example of virtual prepaid (or gift) card, see **Exhibit 14: Credit: Virtual Gift Card**.

⁸⁹For an example of an open-loop gift card, see **Exhibit 5: Credit: Network-Branded Gift Card**.

⁹⁰"Your PayPal Balance: Payment Methods." PayPal.

<<https://www.paypal.com/us/webapps/helpcenter/helpub/article/?solutionId=FAQ2320>> (accessed 6 Oct. 2014).

⁹¹"Bank accounts." PayPal.

<<https://www.paypal.com/us/webapps/helpcenter/helpub/article/?solutionId=FAQ2384&m=CLL>> (accessed 6 Oct. 2014).

⁹²PayPal accepts credit and debit cards that are processed on the Visa, MasterCard, Discover, and American Express networks. See "What credit card can I use with PayPal?" PayPal.

<https://www.paypal.com/us/webapps/helpcenter/selfhelp/article/?solutionId=FAQ1119&topicID=BANK_A_CCOUNTS_AND_CREDIT_CARDS&m=TCI> (accessed 3 Oct. 2014).

⁹³"Use Your Debit or Credit Card to Pay with PayPal." PayPal.

<<https://www.paypal.com/us/webapps/helpcenter/helpub/article/?solutionId=FAQ2358>> (accessed 6 Oct. 2014).

⁹⁴PayPal Credit is a line of credit usable on a PayPal account that is issued by Comenity Capital Bank. In order to apply for PayPal Credit, users must supply the last four digits of their social security numbers and their dates of birth. If a user is approved for PayPal Credit, he or she may use the line of credit to make purchases from participating merchants. See "PayPal Credit." PayPal.

<<https://www.paypal.com/webapps/mpp/billmelater-productoverview>> (accessed 3 Oct. 2014).

bank account.⁹⁵ An eCheck,⁹⁶ MoneyPak,⁹⁷ or a transaction through Coinstar may also be utilized to add value to the PayPal balance.⁹⁸ [REDACTED]

51. During the registration process, PayPal asks potential users to confirm that they are at least 18 years of age.⁹⁹ However, PayPal makes Student Accounts available to minors if first opened by their parents.¹⁰⁰

52. PayPal Student Accounts are accounts that allow minors between the ages of 13 and 17 to make purchases.¹⁰¹ Teenagers are provided with a Debit MasterCard that can be used wherever MasterCard is accepted but is managed by their parents using the PayPal Student

⁹⁵When using a bank account to fund a PayPal balance, money will be transferred directly and will usually take between 3 and 5 days to become available. See “How long does it take to transfer money from a U.S. bank account to my PayPal account?” PayPal.

<https://www.paypal.com/us/webapps/helpcenter/helpub/article/?solutionId=FAQ1470&topicID=ADD_WI_THDRAW_MONEY&m=TCI> (accessed 14 Oct. 2014).

⁹⁶eChecks are a way to use a bank account to fund PayPal transactions. Payment with an eCheck requires 3 to 5 days for a transaction to be completed. See “What is an eCheck?” eBay.

<https://www.paypal.com/us/webapps/helpcenter/helpub/article/?solutionId=FAQ1082&topicID=PAYMENT_METHODS&m=TCI> (accessed 3 Oct. 2014).

⁹⁷A MoneyPak card can be used to add funds to a PayPal account using cash. The MoneyPak must be purchased from a retail location before being redeemed on PayPal, at which point the funds will be made available immediately. See “MoneyPak Store Locator.” MoneyPak.

<<https://www.moneypak.com/StoreLocator.aspx>> (accessed 3 Oct. 2014); and “MoneyPak FAQs.” PayPal. <<https://www.paypal.com/webapps/mpp/greendot-moneypak>> (accessed 6 Oct. 2014).

⁹⁸It is also possible to add money to a PayPal account using a Coinstar kiosk. At the kiosk individuals can add coins to an account by paying a 9.8% fee or add cash by paying a fee of \$3 or \$6, depending on the amount deposited. See “How do I use PayPal at a Coinstar Kiosk?” PayPal.

<https://www.paypal.com/us/webapps/helpcenter/helpub/article/?solutionId=FAQ1706&topicID=ADD_WI_THDRAW_MONEY&m=TCI> (accessed 3 Oct. 2014).

⁹⁹See Screenshot “Review the agreements.” PayPal. Illustrating that the PayPal user agrees to terms contained in “PayPal User Agreement.” PayPal, 11 Sept. 2014.

<https://www.paypal.com/webapps/mpp/ua/useragreement-full?country.x=US&locale.x=en_US&viewType=popup> (accessed 6 Oct. 2014).

¹⁰⁰“PayPal Student Accounts.” PayPal. <<https://www.paypal.com/us/webapps/mpp/student-accounts>> (accessed 3 Oct. 2014).

¹⁰¹*Id.*

Account. This allows parents to keep track of their children's spending and add money to the account.¹⁰²

53. When using PayPal as a payment instrument on Facebook, a Facebook user is redirected to the PayPal site to execute payment on the PayPal platform outside of Facebook.¹⁰³ When the transaction is complete, a user's Facebook account reflects the addition of currency, but does not reflect details of the transaction history completed in PayPal, only the addition of funds.¹⁰⁴ See **Exhibit 15: PayPal: Buy with PayPal** for an exhibit illustrating a Facebook transaction using PayPal.

Facebook Gift Cards as a Payment Instrument

54. Facebook offers closed-loop Facebook Gift or Game cards for sale in fixed dollar denominations.¹⁰⁵ These cards are sold at retail and drug stores and are also available online.¹⁰⁶

55. Once a Facebook user obtains a gift card, it can be redeemed via Facebook's redemption page by entering the PIN on the back of the gift card.¹⁰⁷ Redemption applies specifically to Facebook closed-loop gift or game cards. See **Exhibit 6: Gift Card: Redeeming a Facebook Game Card**, for an example of a closed-loop redemption on Facebook.

56. The Facebook user has the choice of currency (*e.g.*, U.S. dollars) in which to redeem her gift card.¹⁰⁸ The entirety of the gift card is added to the Facebook user's account or in-

¹⁰²*Id.*

¹⁰³"Facebook Payments." *Facebook Developers*. Facebook. <<https://developers.facebook.com/docs/payments/overview>> (accessed 26 Sept. 2014).

¹⁰⁴*Id.*

¹⁰⁵"Facebook Game Cards." Facebook. <https://www.facebook.com/FacebookApps/app_154977384515365?ref=page_internal> (accessed 7 Oct. 2014).

¹⁰⁶*Id.* See also "Where can I purchase Facebook Gift Cards?" Facebook. <<https://www.facebook.com/help/132765076799349>> (accessed 7 Oct. 2014).

¹⁰⁷See "How do I redeem my Facebook Gift Card?" Facebook, July 2014. <<https://www.facebook.com/help/210241279016563>> (accessed 12 Aug. 2014).

¹⁰⁸*Id.*

game balance and remains in that currency.¹⁰⁹ When the Facebook user purchases something in an app, that price is deducted from the user's gift card or account balance;¹¹⁰ any remaining purchase amount requires the entry of an additional payment method. See **Exhibit 6: Gift Card: Redeeming a Facebook Game Card**, for an example of a closed-loop redemption on Facebook.

Mobile as a Payment Instrument

57. [REDACTED]

[REDACTED] This category does not account for all items purchased by Facebook users playing Facebook Games and Apps on a mobile device.¹¹¹ Rather, the Facebook mobile category consists solely of purchases made via a payment method known as mobile carrier billing, where users may charge the cost of a transaction to their phone bill.

Mobile Carrier Billing

58. Mobile carrier billing (also known as Direct Operator Billing, Direct Carrier Billing or Mobile Operator Billing) is a payment option that allows a consumer to charge a transaction to her mobile phone bill. To make a purchase, a Facebook user provides a cell phone number on a merchant's website.¹¹² Then a unique password is sent to the user's cell phone via text message. The consumer uses this password to complete the transaction and receives a charge at a later date on a phone bill.¹¹³ See **Exhibit 16: Mobile: Buy with Mobile** for an illustration of how a Facebook user purchases goods using mobile carrier billing. Generally, mobile carrier billing is used to purchase virtual or digital goods.

¹⁰⁹*Id.*

¹¹⁰*Id.*

¹¹¹"Games Overview." *Facebook Developers*. Facebook.

<<https://developers.facebook.com/docs/gamobimes/overview>> (accessed 8 Oct. 2014).

¹¹²Bustos, Linda. "Carrier Billing: Understanding the Other Alternative Payment." Get Elastic, 4 Sept. 2012. <<http://www.getelastic.com/carrier-billing-understanding-the-other-alternative-payment/>> (accessed 7 Oct. 2014).

¹¹³*Id.*

VIII. FACEBOOK MAY NOT BE ABLE TO RECREATE DETAILS OF A MINOR'S TRANSACTIONS ON FACEBOOK.

59. In this section, for each major payment category, I assess whether Facebook can retrieve transaction data for each minor transaction sufficient to determine the type of payment instrument used.

For Credit, Debit, and Gift Card Transactions, Facebook is Unable to Determine the Specific Payment Type with Certainty.

60. As discussed above, most 15- or 16-digit cards are processed as credit card transactions, including credit cards, debit cards, and gift cards. Determining what specific payment type was used (*e.g.*, credit card, debit card, prepaid debit card, gift card) is not possible.

61. Even assuming that Facebook can retrieve the relevant card numbers from its databases or at least the first six digits, this information would need to be matched using a BIN database. The BIN is the starting series of six digits found on Visa, MasterCard, American Express, and Discover cards. BINs identify the major industry and card issuer but not card type (debit, credit, prepaid, gift).¹¹⁴

62. But matching BINs cannot be done with certainty by merchants, including Facebook. Official BIN databases are not publicly available and may not be regularly updated. An official database may be available to certain institutions' issuers, financial networks or processors, but it is not readily available to merchants.¹¹⁵

63. Unofficial BIN lists and databases are widely available, but would be a poor source of information for the purpose of determining type of card used in historical transactions. Indeed, they often contain incorrect and unreliable information. To illustrate, I checked four cards—a credit

¹¹⁴See fn. 5, *supra*. See, also "ISO Register eligibility questionnaire." Attached to email: Griffin, Gay. "Re: ISO Register of Card Issuer Identification Number." Message to Kyle See. 9 Oct. 2014

¹¹⁵See "ISO Register eligibility questionnaire." Attached to email: Griffin, Gay. "Re: ISO Register of Card Issuer Identification Number." Message to Kyle See. 9 Oct. 2014.

card, a debit card, a prepaid card and a masked prepaid card—in an unofficial BIN database. The results are presented in **Exhibit 17a: Correct BIN Checks**, where the card numbers entered accurately are displayed in the BIN database results and **Exhibit 17b: Incorrect BIN Checks**, where cards, both prepaid, are inaccurately categorized as credit, among other issues highlighted in the exhibit. These inaccuracies highlight the difficulties in ascertaining the type of card used in historical transactions through unofficial BIN lists.

For PayPal Transactions, Facebook is Not Able to Determine the Underlying Funding Source.

64. As mentioned above, *supra* at ¶ 53, a Facebook transaction using PayPal redirects to the PayPal platform for authorization. Facebook has no visibility into what funding source is linked to the PayPal account or *whose* funding source is used. Facebook thus cannot retrieve details regarding a minor’s transaction using PayPal as a payment instrument.

For Mobile Transactions, Facebook is Not Able to Determine the Underlying Funding Source.

65. Similar to PayPal, a Facebook transaction using mobile payment redirects to the mobile service provider and is processed through mobile payment processors such as Boku¹¹⁶ or Zong,¹¹⁷ and the payment does not occur within Facebook. Facebook has no visibility into what funding source is used to pay for the mobile payment or whose funding source is used. Facebook thus cannot retrieve details regarding minors’ transactions using Mobile as a payment instrument.

¹¹⁶“How do I make an in-game purchase on Facebook using my mobile phone?” Facebook, Feb. 2013. <<https://www.facebook.com/help/226504034029906>> (accessed 7 Oct. 2014); and “About.” Boku. <<http://www.boku.com/about/>> (accessed 8 Oct. 2014).

¹¹⁷Zong is a mobile service provider that “allows consumers to easily pay for purchases from their mobile phones or computers through direct carrier billing.” Zong was acquired by eBay in the third quarter of 2011. See “eBay Inc. to Acquire Zong.” PayPal, 7 July 2011. <<https://www.paypal-media.com/press-releases/ebay-inc-to-acquire-zong>> (accessed 6 Oct. 2014).

For Alt Pay Transactions, It Is Uncertain how Facebook Could Recreate Transaction Data.

66. I am not aware of any method that would allow Facebook to recreate historical payments made via Alt Pay methods.¹¹⁸ Similar to PayPal, Facebook has no visibility into the specific funding sources used to fund these payment methods.

IX. EVEN IF FACEBOOK WERE ABLE TO RECREATE TRANSACTION DATA FOR ALL CATEGORIES, IT WOULD BE UNABLE TO DISTINGUISH BETWEEN A MINOR WHO HAD COMPLETE, EFFECTIVE, OR AMBIGUOUS CONTROL OVER THE PAYMENT INSTRUMENT, AND A MINOR WHOSE TRANSACTION WAS UNAUTHORIZED.

67. Assuming for argument's sake that Facebook *were* able to determine the specific payment instrument used, I assess whether Facebook could determine whether a teenager had or did not have control over the payment instrument used at the time of purchase.

68. For the purposes of this report, I categorize and define control as 1) *Complete Control* (the ability to make purchases using one's own funds without input or approval from parents or a party known to them); 2) *Effective Control* (the ability to make purchases using funds in an account under one's own name or using a manner of payment in one's own name, but where regulatory restrictions may require an adult to also be listed on account); or 3) *Ambiguous Control* (ability to make purchases due to discussions and associated permission but using a form of payment exclusively in the name of parent or other third party). **Exhibit 18: Payment Instrument Spectrum of Control by Teenagers** 1) plots whether Facebook can recreate or otherwise identify transaction data based on major payment instruments accepted by Facebook; and 2) demonstrates the type of control a teenager may have over a specific payment instrument.

69. Below, I detail instances where a teenager can exert control over each of the various payment types accepted by Facebook: Credit, PayPal and Mobile. Because of the large number of

¹¹⁸Chernyavsky, Michelle. "Facebook Payments." Message to Ethan Cohen-Cole. 15 Oct. 2014. E-mail. ("Facebook's major payment types are categorized as Credit Card, PayPal, and Mobile. The only alternative payment method it currently accepts is Oink. Facebook is unable to reconstruct the full transaction data for alternative payment methods.").

payments processed as “Credit,” *i.e.*, processed through the credit card networks, for this category in particular, I separately assess how a teenager can have control over a credit card, debit card, prepaid card, or open-loop gift card.

How a Teenager Can Have Control of a Credit Card

70. As discussed *supra* at ¶ 22, a teenager under the age of 18 cannot be issued a credit card in his own name, for his own account. However, for many credit card issuers, a teenager can be added as an authorized user on a credit account.¹¹⁹ Thus, from the perspective of a merchant, current payment authorization systems do not provide a mechanism to inform a merchant that a card entered is from a minor authorized user who is associated with a parent’s account.

71. Parents may add teenagers to their credit card accounts to build credit history for their children, garner reward points from the teenager’s purchases, or allow their teenagers to transact in the marketplace without the burden of carrying cash.¹²⁰ Some teenagers keep money on their parents’ credit cards; *see Exhibit 19: Where Teens Store Money*.

72. In the case of a teenager who has been named an authorized user on a credit card account or who explicitly stores his money on a parent’s credit card, that teenager has *effective control* over the credit card. That is, a teenager with a card in his or her own name is authorized to use the card to make purchases. The parent card owner does not need to be present for the teenager to use the card and does not need to authorize the transactions the teenager chooses to make. While a parent may have verbal agreements with his or her teenager around permitted purchases, these agreements are of course not available to, and are not verifiable by, a merchant.

¹¹⁹Berger, Rob. “A Simple Way to Build Credit for the First Time.” Huffington Post, 24 Mar. 2014. <http://www.huffingtonpost.com/rob-berger/build-credit-for-the-first-time_b_5003904.html> (accessed 6 Oct. 2014). *See also* “Add an Authorized User.” Discover. <<https://www.discover.com/credit-cards/help-center/account/authorized-users.html>> (accessed 6 Oct. 2014).

¹²⁰*Id.*

73. A teenager can also have control over a credit card that is not in his or her own name. Examples include situations where a teenager has been given carte-blanche use of a parent's card, or a teenager has been authorized to spend a certain amount on the parent's card. Sometimes parents may allow their children to use their credit cards to make online purchases in exchange for cash, and they may actually watch their children make in-game purchases. Plaintiff I.B.'s initial purchase of \$20 is an example of this: he alleges he gave his mother \$20 in cash in exchange for the ability to make a \$20 purchase on Facebook using his mother's credit card. In these situations, a teenager has control over the payment instrument, be it a one-time use or for an extended period of time. Here, determining permission and parameters set by parents to their teenagers is circumstantial and control is *ambiguous*.

74. When a teenager makes a purchase using a credit card, Facebook has limited ability to determine on a systematic basis what degree of control the teenager has over the payment instrument or the degree of authorization that a parent or card owner may have given the teenager. Indeed, Facebook has no ability to determine the degree of permission that a card owner may have given to the teenager. As well, Facebook has no way to distinguish between the parent entering information directly into the Facebook payment screens or the teenager doing so with the parent's permission.

75. To summarize, given the variety of scenarios that may have led to a teenager using a credit card as a payment instrument, Facebook is unable to determine the level of control that was exerted by the purchasing teenager.

How a Teenager Can Have Control of a Debit Card

76. A debit card is a payment instrument linked to a checking account at a bank. Many banking institutions offer teenagers checking accounts that come with optional debit cards. A teenager can have *effective control* over the funds associated with the account because, although a

parent's signature is required to open the accounts, teenagers can subsequently access the account without any further limitations imposed by the bank or the teenager's parents.

77. In the case where a teenager is the primary account holder on a checking or savings account,¹²¹ she is issued a debit card associated with the account that has her name on it. The teenager then has possession and control of the funds in the account (the teenager has either joint or complete ownership of the underlying funds),¹²² and also has *effective control* over the debit card as a funding source. Plaintiff J.W., for example, has his own checking account in which he stores his own earnings, and he has a debit card linked to the account, which he uses to make purchases.¹²³

78. Additionally, teenagers can be added to the checking accounts of their parents, and this authorizes them to spend using the account.¹²⁴ This type of account often has a debit card associated with the names of the primary account holders but may or may not have a debit card for the teenager who is listed as an authorized account holder.¹²⁵ In the case where a teenager is an authorized user of a parent's debit account, he or she would also have *effective control* over the debit card as a funding instrument.

79. However, similar to credit cards above, one cannot assume that because a teenager is not listed as an authorized user on an account that she exerts no control over the funding instrument. For example, teenagers can be given use of their parents' debit card to pay for items and/or spend freely with the card. A teenager may also be able to make purchases using the

¹²¹See **Exhibit 8: Credit: Minor Specific Virtual Visa Debit Card.**

¹²²UTMA accounts are specifically limited to holding assets belonging to a minor under the custody of an adult. Joint accounts can be co-owned assets. "SI 01120.205 Uniform Transfers to Minors Act." U.S. Social Security Administration, 31 Jan. 2008. <<https://secure.ssa.gov/poms.nsf/lnx/0501120205>> (accessed 14 Oct. 2014).

¹²³J.W. Tr. 139:4-17; 53:12-55:15.

¹²⁴"Authorized Signer vs. Joint Owner." Fine Mark Bank, 18 June 2012.

<<http://www.finemarkbank.com/news/authorized-signer-vs.-joint-owner/>> (accessed 7 Oct. 2014).

¹²⁵*Id.*

parent's debit card but subject to parameters set by the parent. In all of these instances, control is *ambiguous*.

80. Virtual debit cards now are available as an option for parents and children. Virtual debit cards are considered ideal for people who like to shop online but do not have or do not want to use their credit card for online purchases. They are available to children listed on their parents' accounts. Like a standard debit card, control depends on the relationship and conversation surrounding its use.

81. In sum, a teenager may have many different levels of control over the funds behind a particular debit card, ranging from *effective control* over his own funds in his own bank account to more *ambiguous control*. Facebook is unable to distinguish between the levels of control that a teenager may have exerted over funds behind a debit card.

How a Teenager Can Have All Levels of Control over Prepaid Cards

82. Prepaid cards are widely available for purchase by teenagers. For teenagers who acquire and load a prepaid card with their own cash, they have *complete control* over the payment instrument.

83. Certain types of prepaid cards are reloadable. Some of these cards require registration, which may require a teenager to attest to his or her age.¹²⁶ However, the initial purchase of a reloadable prepaid card can occur in a store, with cash. Additionally, cards can be reloaded, in stores, with cash. As a result, teenagers can have *complete control*.

84. Both prepaid and prepaid reloadable cards are available as virtual cards, which serve the same function, but the initial purchase and any subsequent value loading occur online. Teenagers can load a prepaid virtual card using a variety of payment instruments such as a one-

¹²⁶“American Express Serve Consumer User Agreement.” American Express Serve, 2014. <https://www.serve.com/legal.html#establishing_account> (accessed 6 Oct. 2014).

time use card, a gift card, their parents' debit or credit cards, or a PayPal account. In each case, the funds get placed onto a virtual instrument that resembles a credit card in function, that is, has 16 digits, an expiration date, CVV2 or CVC2 code and billing address. See **Exhibit 9: Credit: Virtual Reloadable Prepaid Card** for an example. Card-not-present merchants cannot distinguish between a prepaid virtual card and a physical card. Additionally, where a virtual card is used, it is not possible for an online merchant to determine whether it is reloadable or nonreloadable.

85. So called "masked cards" are similar to prepaid virtual cards, but the address and transaction itself are linked to the masked card provider, not the purchaser.¹²⁷ Masked cards are available to users seeking privacy in their online transactions, which reasonably can include teenagers. The user sets up an account with a masked provider and assigns a value to a future purchase; a masked card is then issued in that amount. Depending on the transaction and provider, the masked card can be used one or several times, until the value on the card is exhausted.¹²⁸

Exhibit 7: Credit: Create a Masked Card shows how a masked card can be issued. As with debit or credit cards, a teenager can exert either *effective* or *ambiguous control* over a masked card. However, because the payment instrument entry via a pay dialog for a masked card in a card-not-present merchant transaction looks exactly like other credit cards, there is no mechanism for Facebook to differentiate this transaction from other payment instruments.

86. Importantly, Facebook has little or no ability to fully identify the type of instrument used since they are all processed as credit transactions. Furthermore, even if it could distinguish between the types of cards, Facebook has no ability to identify what level of control, the teenager

¹²⁷Tanner, Adam. "Why You Should Use a Masked Credit Card to Shop Online." *Forbes*, 4 Dec. 2013. <<http://www.forbes.com/sites/adamtanner/2013/12/04/why-you-should-use-a-masked-credit-card-to-shop-online/>> (accessed 6 Oct. 2014).

¹²⁸"Masked Cards in 30 Seconds." Abine. <<https://www.abine.com/maskme/features/cards/>> (accessed 6 Oct. 2014).

has over the funds—*e.g.*, if she purchased a prepaid card with her own cash or if it is a parent’s card.

How a Teenager Typically Has Complete Control over a Network-Branded Gift Card or Facebook Gift Card

87. As mentioned above, *supra* at ¶ 28, gift cards are frequently used to provide gifts to teenagers, and the cards are easily purchased online or at physical stores.¹²⁹ In addition to receiving gift cards, teenagers can also purchase gift cards with their own funds, including cash. Some gift cards do not have a stated age requirement for the holder.¹³⁰

88. Both plaintiffs testified that they purchase gift cards themselves and use them to make purchases online. I.B. testified that he has used gift cards that he purchased himself to make music purchases and to make purchases in online games.¹³¹ In addition, I.B. also frequently gives his mother money and asks her to buy gift cards for him that he then uses to make purchases on the Xbox gaming system.¹³² Plaintiff J.W. testified that he purchases gift cards for use at restaurants, the movie theater, and retail stores.¹³³

89. An individual who has a gift card in their possession has *complete control* over how to spend the value.^{134, 135}

¹²⁹Gift cards are regularly stocked at drugstores, grocery stores, and “big box” retailers. They include retailer-branded cards, such as Facebook, as well as network-branded cards issued by a credit card company. *See* “American Express Product Locator.” American Express.

<<http://www.aetclocator.com/wheretobuy/landing.jsf>> (accessed 8 Aug. 2014). *See* also “Gift Cards.” Walgreens. <<http://www.walgreens.com/store/c/gift-cards/ID=360671-tier2general>> (accessed 14 Oct. 2014).

¹³⁰*See*, for example, “Gift Cards for Teens.” Gift Card Mall. <<https://www.giftcardmall.com/gifts/gift-cards-for-teens.aspx>> (accessed 8 Oct. 2014).

¹³¹I.B. Tr. 82:19-83:15.

¹³²Glynnis Bohannon Tr. 199:6-200:5.

¹³³J.W. Tr. 57:19-59:18.

¹³⁴Credit Card Act 2009. H.R. 627, 111th Cong., U.S. G.P.O (2009) (enacted).

¹³⁵While there may be certain parameters set by a giftor to the giftee, such as a mandate to spend on clothing for school or disallowing someone to spend the gift card on games, merchants do not (and cannot) verify whether the person presenting the gift card for redemption is spending it according to parameters which may have been set by the giver.

90. In sum, a teenager may exercise *complete control* over the funds used in a Network-Branded Gift Card or Facebook Gift Card, and Facebook has no ability to identify the level of control a teenager possesses over the underlying funds.

How a Teenager Can Have Control over a PayPal Account

91. Teenagers can have a PayPal student account that includes access to an online PayPal account in addition to a PayPal debit card that is processed through MasterCard. A PayPal student account is tied to a parent account. In this instance, a teenager would have *effective control* over his PayPal account and be able to freely use it as a funding instrument to make Facebook purchases or other purchases.

92. For a standard PayPal account, a teenager could have *ambiguous control* over her parent's PayPal account. A teenager, for instance, could be given her parent's login information to make one-time purchases, or recurring purchases. Additionally, because PayPal is a common Internet payment instrument, a parent could foreseeably give her teenager full access to a parental PayPal account to facilitate the teenager's online transactions.

93. Facebook does not have access to information regarding the funding source that is linked to a PayPal account.¹³⁶

How a Teenager Can Have Control over Mobile Payments Made Through a Traditional Cell Phone

94. 78% of teenagers have a mobile phone.¹³⁷ To obtain mobile access, teenagers must be added to an adult's primary account or own a prepaid phone, that is, a mobile phone for which credit is purchased in advance of using in a pay-as-you-go set up.¹³⁸

¹³⁶Chernyavsky, Michelle. "Facebook Payments." Message to Ethan Cohen-Cole. 15 Oct. 2014. E-mail ("For PayPal transactions, Facebook is not able to identify the payment instrument or identity of the authorized user of the payment instrument.").

¹³⁷Madden, Mary, Amanda Lenhart, Maeve Duggan, Sandra Cortesi, and Urs Gasser. "Teens and Technology 2013." Pew Research Center, 2013, at 2.

¹³⁸"Prepaid Plans." T-Mobile. <<http://prepaid-phones.t-mobile.com/prepaid-plans>> (accessed 6 Oct. 2014).

95. A teenager may conduct a mobile payment transaction online under various scenarios. For example, a teenager can make a purchase using his or her own mobile device. In this case, the teenager has *effective control* if the phone number listed belongs to a phone owned by the teenager. A teenager could also use an adult's mobile phone to make a purchase with or without the adult's permission. In such cases, Facebook would not have information on who owned the phone number used.

X. EVEN IF FACEBOOK WERE ABLE TO RECREATE TRANSACTION DATA FOR "CREDIT" TRANSACTIONS AND DETERMINE WHETHER A MINOR MADE AN UNAUTHORIZED PURCHASE, FACEBOOK CANNOT KNOW THE DETAILS OF THE ACCOUNT HOLDER'S AGREEMENT WITH THE CARD ISSUER – WHICH MAY HOLD PARENTS EXPLICITLY RESPONSIBLE FOR THE SPENDING OF TEENAGERS.

96. Even if Facebook could identify specific instances where a minor had no form of control over the payment instrument and used it without consent, parents may have explicitly agreed to accept responsibility for any charges by other holders of the account.

97. As an example, SAFE Credit Union's Visa agreement specifically holds cardholders accountable for unauthorized use by minors. The relevant provision reads:

If we issue you a card, you agree to repay all debts and the finance charge arising from the use of the card and the card Account. For example, you are responsible for charges made by yourself, your spouse, and minor children. Use of the card by anyone else will be presumed to be with your consent. You will be considered responsible for all resulting charges.¹³⁹

Exhibit 20: *Cardholder Agreement with Minor Provision* shows the excerpt from the contract.

¹³⁹“Platinum Visa Agreement and Disclosure Statement.” SAFE Credit Union, 28 Aug. 2013. PDF File. <https://www.safecu.org/Credit_Cards/pdfs/Platinum_S628V.pdf>, at 1.

98. Thus, even if Facebook were able to determine that a minor was making a charge without parental authorization (which would be a highly individualized determination), it still cannot know whether the charge is contractually authorized without locating and reviewing the specific cardholder agreement at issue. But the terms of cardholder agreements vary widely, and neither these cardholder agreements, nor information regarding which account numbers they apply to, are widely in the public domain; Facebook is not a party to the agreements.¹⁴⁰ It would be difficult-to-impossible to ascertain with any certainty whether the charge is contractually authorized for every transaction.

XI. COMMENTS ON PLAINTIFFS' REQUEST FOR INJUNCTIVE RELIEF

99. In their Memorandum of Points and Authorities in Support of Their Motion for Class Certification (Dkt. #82-1), Plaintiffs express their wish that the Court, among other things, issue an order that would “allow a sale to a minor user only upon the manifestation of express and informed consent by the payment-vehicle owner[.]”¹⁴¹ I have been asked by counsel to address certain comments related to Plaintiff’s request.

100. Plaintiffs, for example, appear to imply that Facebook (a) could require a minor to reenter a password to make subsequent purchases with a credit or debit card,¹⁴² (b) could simply check that the name of the cardholder matches the name of the Facebook account holder,¹⁴³ or (c) could require that the user enter the phone number associated with a credit or debit card to (i)

¹⁴⁰See “Cardmember Agreement.” American Express, 30 June 2014. <<https://web.aexp-static.com/us/content/pdf/cardmember-agreements/blue/BlueAECB.pdf>> (accessed 6 Oct. 2014). See also, “Card Agreement.” Citibank, July 2013. <https://www.citicards.com/cards/acq/cmaView.do?PID=011&cma=true&locale=en_US> (accessed 6 Oct. 2014).

¹⁴¹Plaintiffs’ Memorandum of Points and Authorities in Support of Their Motion for Class Certification (Dkt. #82-1) (“Plaintiffs’ MPA”), at 17:20-21.

¹⁴²*Id.* at 8:10-12.

¹⁴³*Id.* at 8:20-21.

verify the phone number against card network records or (ii) text or call the number and obtain consent.¹⁴⁴

101. None of these suggestions are viable options. Requiring the user to reenter a password would do nothing to ensure parental authorization for purchases made on teenagers' accounts, since the only password that Facebook could require a user to reenter is the teenage user's own password. Facebook does not require teenagers to have accounts linked to their parents' accounts.

102. Facebook also cannot feasibly require that the name of the cardholder match the name on the Facebook account.¹⁴⁵ For example, the name on a credit card could easily differ from the name on a user's Facebook account (e.g., "Jonathan Smith" versus "Jon Smith" versus "Jonathan S. Smith"), rendering it difficult to run such a comparison without triggering numerous false indicators of a failed match. In addition, many cardholder agreements *allow* a cardholder to let family members make purchases on the cardholder's card with the cardholder's authorization. As is apparent from the testimony in this matter, this type of agreement can occur. For example, in the case of I.B.'s initial \$20 purchase, I.B.'s mother *authorized* the \$20 purchase and I.B. presumably entered his mother's name on the payment screen. An attempt to match a name as a basis of authorization would have led to rejection of I.B.'s initial \$20 purchase—even though I.B.'s parents had provided explicit consent. Finally, this highlights that the suggestion that Facebook could check that names match is not a solution for verifying authorization. It does not suggest any method for obtaining such authorization.

¹⁴⁴*Id.* at 8:21-23.


¹⁴⁵Chernyavsky, Michelle. "Facebook Payments." Message to Ethan Cohen-Cole. 15 Oct. 2014. E-mail. ("Facebook cannot easily match the name of a credit card holder to the name on a user's Facebook account.").

103. Requiring a user to enter the phone number associated with the credit or debit card and verifying that number against the card network records would not solve the problem because teenagers generally know both their own home phone numbers and their parents' phone numbers.

104. Finally, requiring Facebook to text or call a given phone number would not work as an authorization method for a number of reasons. First, a user such as J.W. who is trying to use his parents' credit card without permission would simply enter his own phone number into the payment screen. Thus, the requirement would do nothing to ensure that there is parental permission. Second, because, as discussed above, teenagers have many ways to make purchases using their own funds or using the parents' funds with authorization, imposing such a requirement would impose unduly difficult restrictions on teenagers' ability to make purchases using their own funds or purchases using their parents' funds where they have explicit ongoing authorization.

105. I am further not aware of a mechanism currently in use by similarly situated merchants through which parental consent for purchases made on teenagers' accounts can be conveyed, and I cannot envision a mechanism that would enable Facebook to know with certainty that a teenager's purchase was expressly permitted by an informed parent or other adult third-party.

Dated: October 16, 2014



Ethan Cohen-Cole, Ph.D.

Exhibit 1

Key Features of 16 Digit Credit/Debit Cards



Notes:

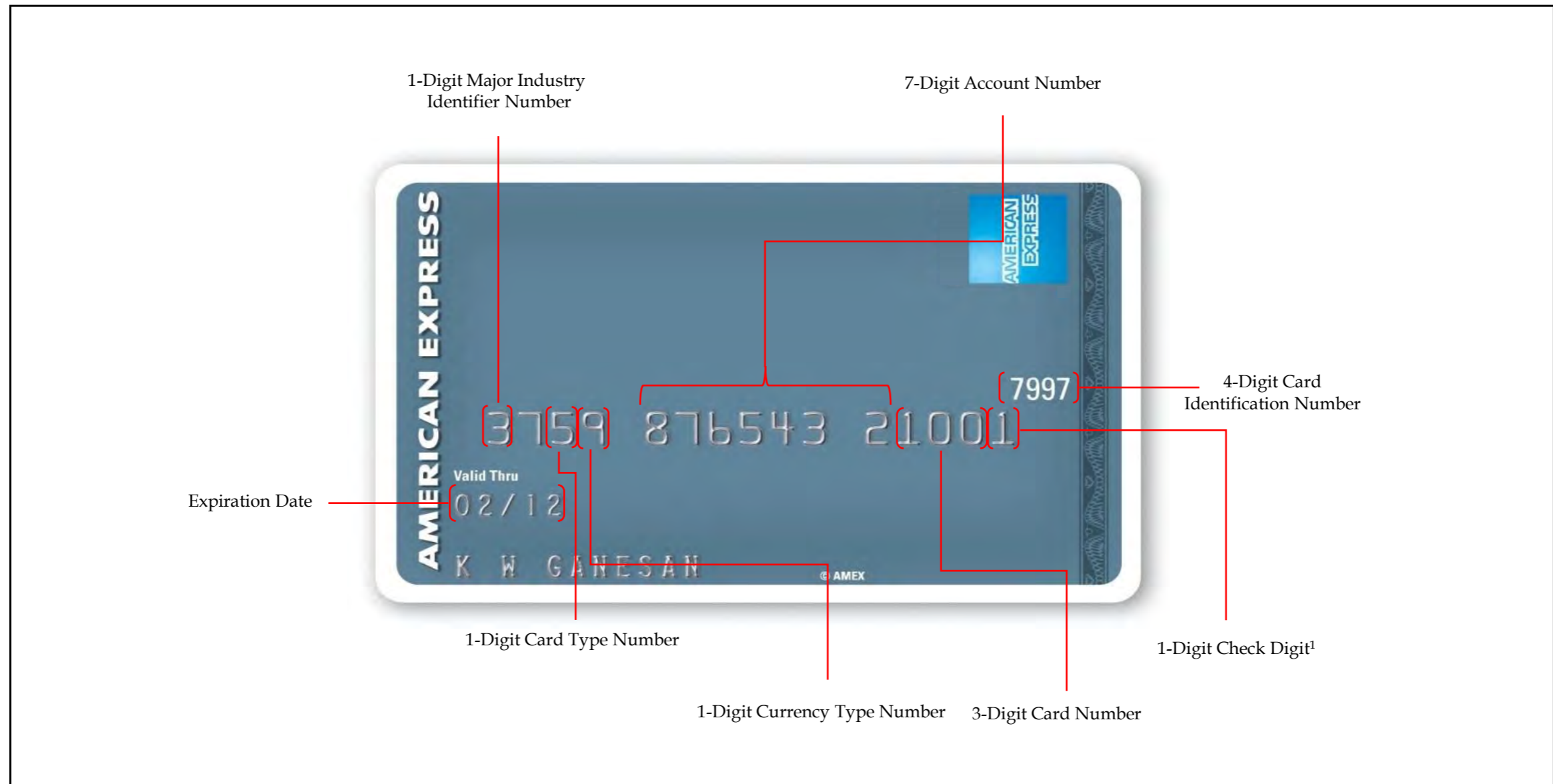
1. The last digit on a credit card number confirms the Luhn algorithm to check the validity of credit card numbers. The algorithm is to double the alternating digits of a credit card number starting with the second digit from the right. If the value of the product is two digits, add the digits in the product to get the resulting value. Add these new values to the non-doubled digits in the credit card number. If the credit card number is valid, the sum of these values plus the check digit will add up to a number ending in zero. The card number depicted above is not valid and therefore will not adhere to the Luhn algorithm.
2. MasterCard's security code is referred to as a CVC2 number.
3. Discover's security code is referred to as a CID number.

Sources:

- McClary, Bruce. "Credit Card Numbers - What Do They Mean? A look at What's Inside Your Credit Card." ClearPoint Credit Counseling Solutions, 11 Apr. 2013. <<http://www.clearpointcreditcounselingsolutions.org/what-do-credit-card-numbers-mean-a-look-at-whats-inside-your-credit-card/>> (accessed 23 Sept. 2014).
- "Issuer Identification Number (IIN)." American National Standards Institute. <http://www.ansi.org/other_services/registration_programs/iin_registration.aspx> (accessed 16 Sept. 2014).
- "3-Digit Security Code." Visa. <<http://usa.visa.com/personal/security/3-digit-security-code.jsp>> (accessed 18 Sept. 2014).
- "MasterCard Card Security Features." MasterCard. <http://www.mastercard.com/ca/merchant/en/getstarted/Anatomy_MasterCard.html> (accessed 18 Sept. 2014).
- "Glossary." Discover Bank. <<https://www.discover.com/credit-cards/help-center/glossary.html>> (accessed 18 Sept. 2014).
- Bartlett, Sandy. "Credit Card Validation-Check Digits." <http://web.eecs.umich.edu/~bartlett/credit_card_number.html> (accessed 1 Oct. 2014).
- "ISO/IEC 7812-1:2006 Identification cards - Identification of issuers - Part 1: Numbering system." International Organization for Standardization, 15 Oct. 2006.
- "FAQ." BinDB. <<https://www.bindb.com/faq.html#g1>> (accessed 14 Oct. 2014).

Exhibit 2

Key Features of 15 Digit American Express Cards



Note:

1. The last digit on a credit card number confirms the Luhn algorithm to check the validity of credit card numbers. The algorithm is to double the alternating digits of a credit card number starting with the second digit from the right. If the value of the product is two digits, add the digits in the product to get the resulting value. Add these new values to the non-doubled digits in the credit card number. If the credit card number is valid, the sum of these values plus the check digit will add up to a number ending in zero. The card number depicted above is not valid and therefore will not adhere to the Luhn algorithm.

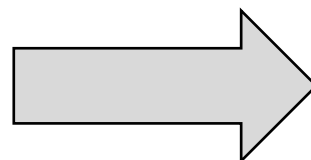
Sources:

- McClary, Bruce. "Credit Card Numbers - What Do They Mean? A look at What's Inside Your Credit Card." ClearPoint Credit Counseling Solutions, 11 Apr. 2013. <<http://www.clearpointcreditcounselingsolutions.org/what-do-credit-card-numbers-mean-a-look-at-whats-inside-your-credit-card/>> (accessed 23 Sept. 2014).
- "American Express Gives Consumers Fee Freedom with Revolutionary Prepaid Card." American Express, 14 June 2011. <<http://about.americanexpress.com/news/pr/2011/revpp.aspx>> (accessed 23 Sept. 2014).
- "How Can You Reduce Risk When the Card is Not Present?" American Express. PDF File. <https://www.americanexpress.com/us/content/merchant/pdf/fraud-prevention/training-resources/FP-CNPG_0109.pdf>.
- Bartlett, Sandy. "Credit Card Validation-Check Digits." <http://web.eecs.umich.edu/~bartlett/credit_card_number.html> (accessed 1 Oct. 2014).
- "ISO/IEC 7812-1:2006 Identification cards - Identification of issuers - Part 1: Numbering system." International Organization for Standardization, 15 Oct. 2006.

Exhibit 3

Credit: Nonreloadable Prepaid Card

Purchase a major credit card network's prepaid card at a retail location



Example of OneVanilla Prepaid Card



Source:

"Which Vanilla Are You?" *OneVanilla*. InComm. <<https://www.onevanilla.com/onevanilla/about.html>> (accessed 19 Sept. 2014).

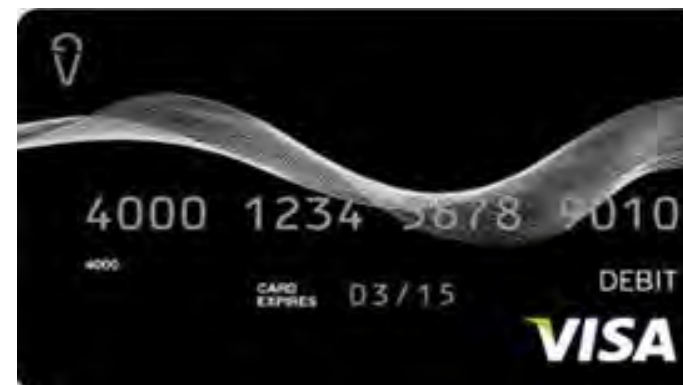
Exhibit 4

Credit: Reloadable Prepaid Card

Purchase a major credit card network's prepaid card at a retail location



Example of Visa MyVanilla Card



Example of American Express Serve Card



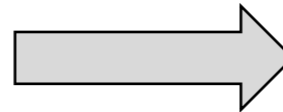
Sources:

- “Which Vanilla Are You?” *OneVanilla*. InComm. <<https://www.onevanilla.com/onevanilla/about.html>> (accessed 19 Sept. 2014).
- “Why American Express Serve?” American Express. <<https://www.serve.com/>> (accessed 19 Sept. 2014).
- “Vanilla Reload.” *OneVanilla*. InComm. <<https://www.vanillareload.com/where-buy>> (accessed 8 Oct. 2014).

Exhibit 5

Credit: Network-Branded Gift Card

Purchase a major credit card network's prepaid gift card at retail location or online



Gift card can be used for card present or card-not-present transactions

Example of American Express Gift Card



Example of Visa Gift Card

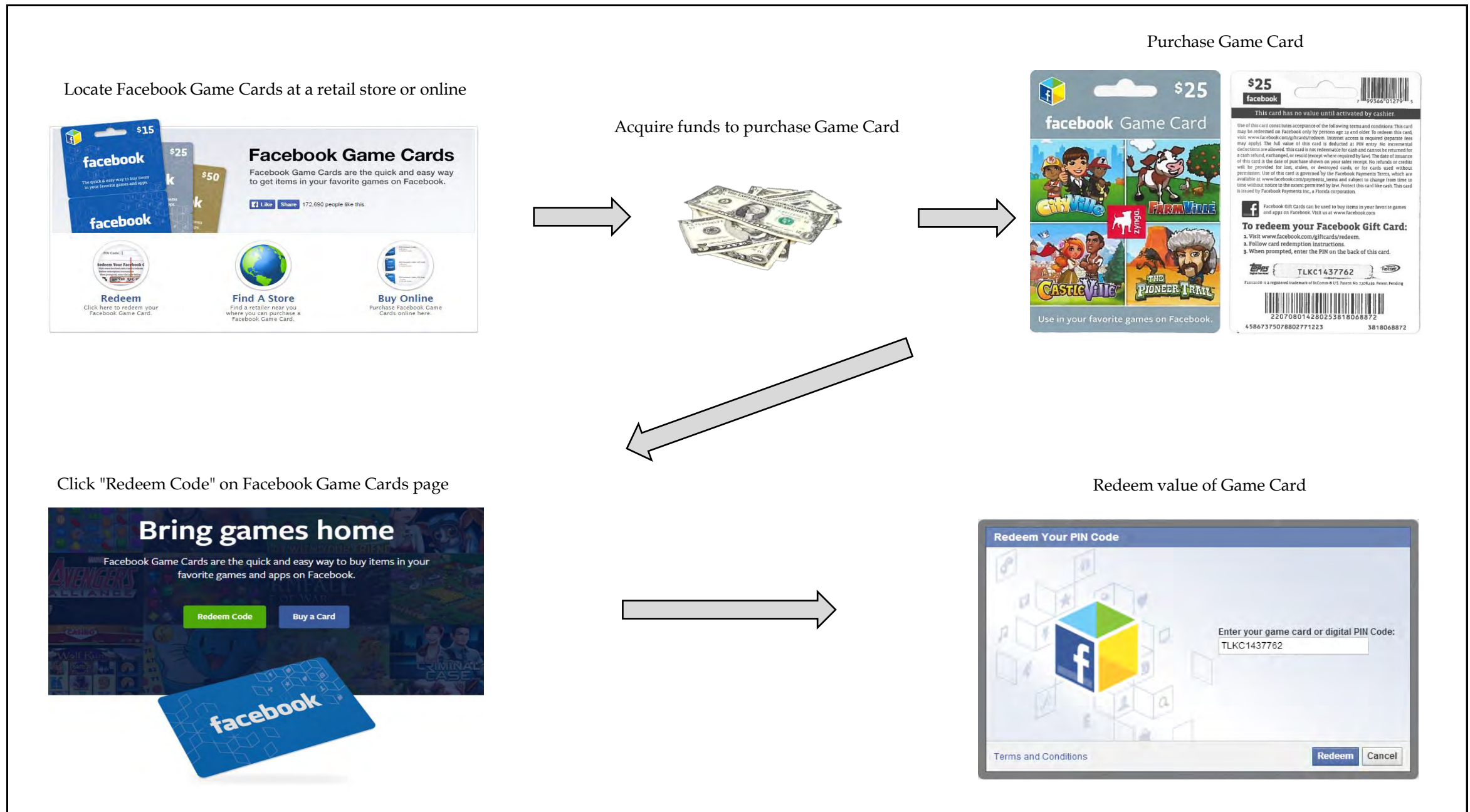


Sources:

- “American Express Product Locator.” American Express. <<http://www.aetlocator.com/wheretobuy/landing.jsf>> (accessed 8 Aug. 2014).
- “American Express Gift Card and American Express eGift Card Cardholder Agreement.” American Express. <<https://www.americanexpress.com/us/content/prepaid/gift-cards/terms-and-conditions.html>> (accessed 16 Sept. 2014).
- “Gift Cards & Business Gift Cards.” American Express. <<https://www.americanexpress.com/gift-cards/>> (accessed 14 Oct. 2014).
- “Find a prepaid card (Gift Cards).” Visa. <<http://usa.visa.com/locators/get-a-card.jsp?filter=gift-card>> (accessed 22 Sept. 2014).
- “Visa Gift Card FAQ.” Visa. <<http://usa.visa.com/personal/personal-cards/gift-cards/faq.jsp>> (accessed 30 Sept. 2014).

Exhibit 6

Gift Card: Redeeming a Facebook Game Card



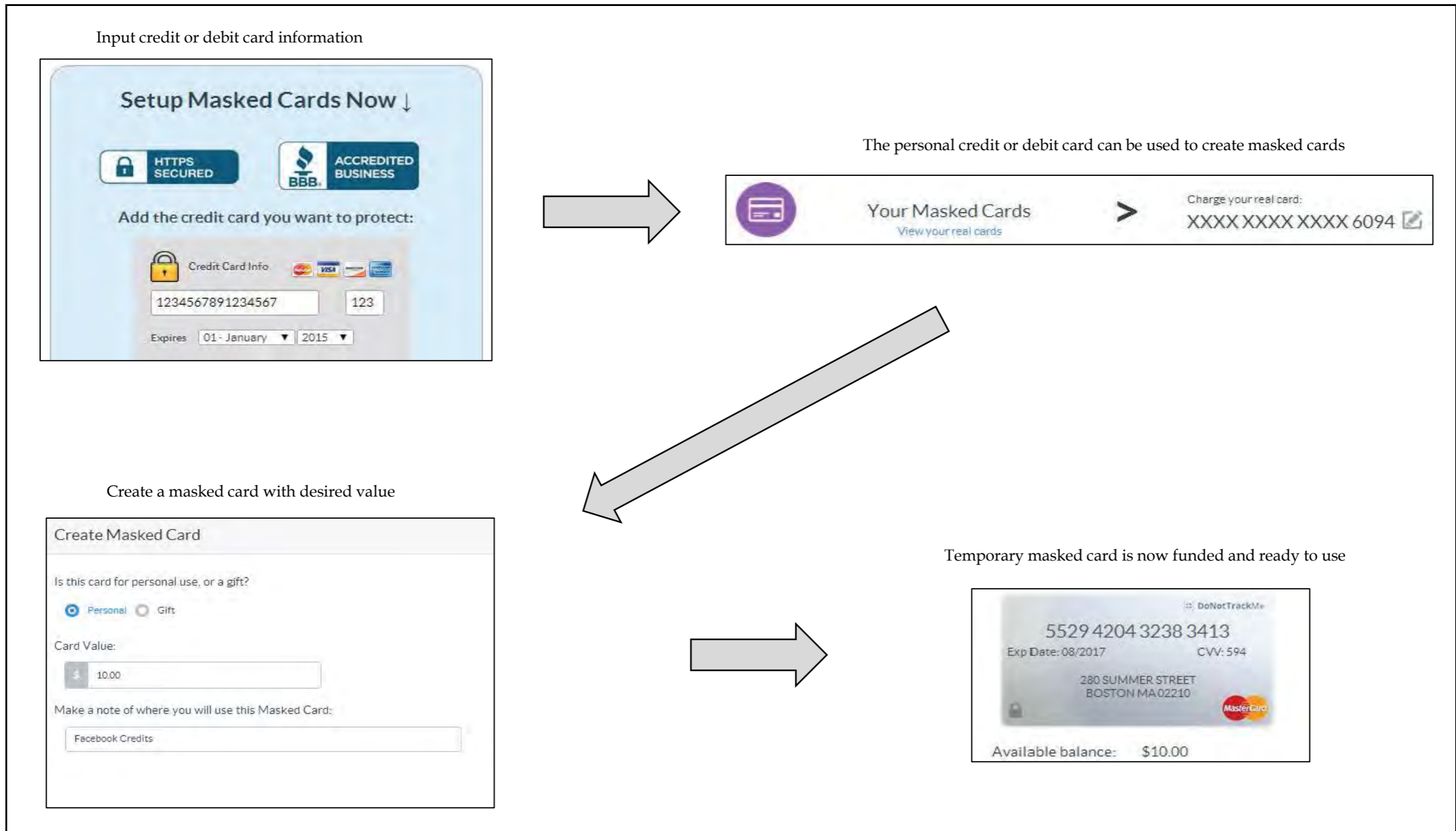
Note:

1. Facebook Gift Cards are redeemed using the same steps as Facebook Game Cards.

Sources:

- "Facebook Game Cards." *App Center*. Facebook. <https://www.facebook.com/FacebookApps/app_154977384515365?ref=page_internal> (accessed 7 Oct. 2014).
- "Bring games home." Facebook. <<https://www.facebook.com/gamecards?a=redeem>> (accessed 29 Sept. 2014).

Exhibit 7 Credit: Create a Masked Card



Source:

"Masked Cards." Abine. <<https://dnt.abine.com/#/cards/wallet>> (accessed 14 Oct. 2014).

Exhibit 8

Credit: Minor Specific Virtual Visa Debit Card

RBC® Virtual Visa® Debit

Pay for your online purchases with a debit card

Whether you don't have a credit card or simply prefer to pay with debit, RBC Virtual Visa Debit gives you another payment option — pay for online, telephone or mail order purchases directly from your bank account¹.

▶ [Benefits To Paying with Virtual Debit](#)

▶ [How it works](#)

An Example of RBC Virtual Visa Debit In Action



Julia
The Mother

- 44 year-old mom, juggling family and career
- Shops online to save time and prefers to pay with debit over credit whenever possible

Solution for Julia



RBC Virtual Visa Debit



Valerie
The Daughter

- 17-year old high school student who loves buying music and apps
- Tired of asking for mom's credit card to buy a \$2 tune every time
- Wants to give back when she can

Solution for Valerie



Free The Children Virtual Visa Debit

Julia uses RBC Virtual Visa Debit to pay for her coffee and monthly bills, so she knows exactly how much she spends in order to better manage her budget.



1 of 3

Valerie links her Free The Children Virtual Debit card to her PayPal®, Apple, and other online shopping accounts to pay for her music and apps on iTunes®.



Julia loves that these payments are not counted towards her account package debit limits!



2 of 3

Valerie can now make her own spending decisions within a budget mom is comfortable with and no longer has to ask for mom's credit card for every purchase!



Julia sets up a daily spending limit of \$25 on Valerie's Free The Children Virtual Debit card. This gives her peace of mind that Valerie will stick to her spending goals while learning to manage her own budget.



3 of 3

The coolest part is that with every purchase Valerie makes, Valerie supports Free The Children with their initiatives that help kids around the world.

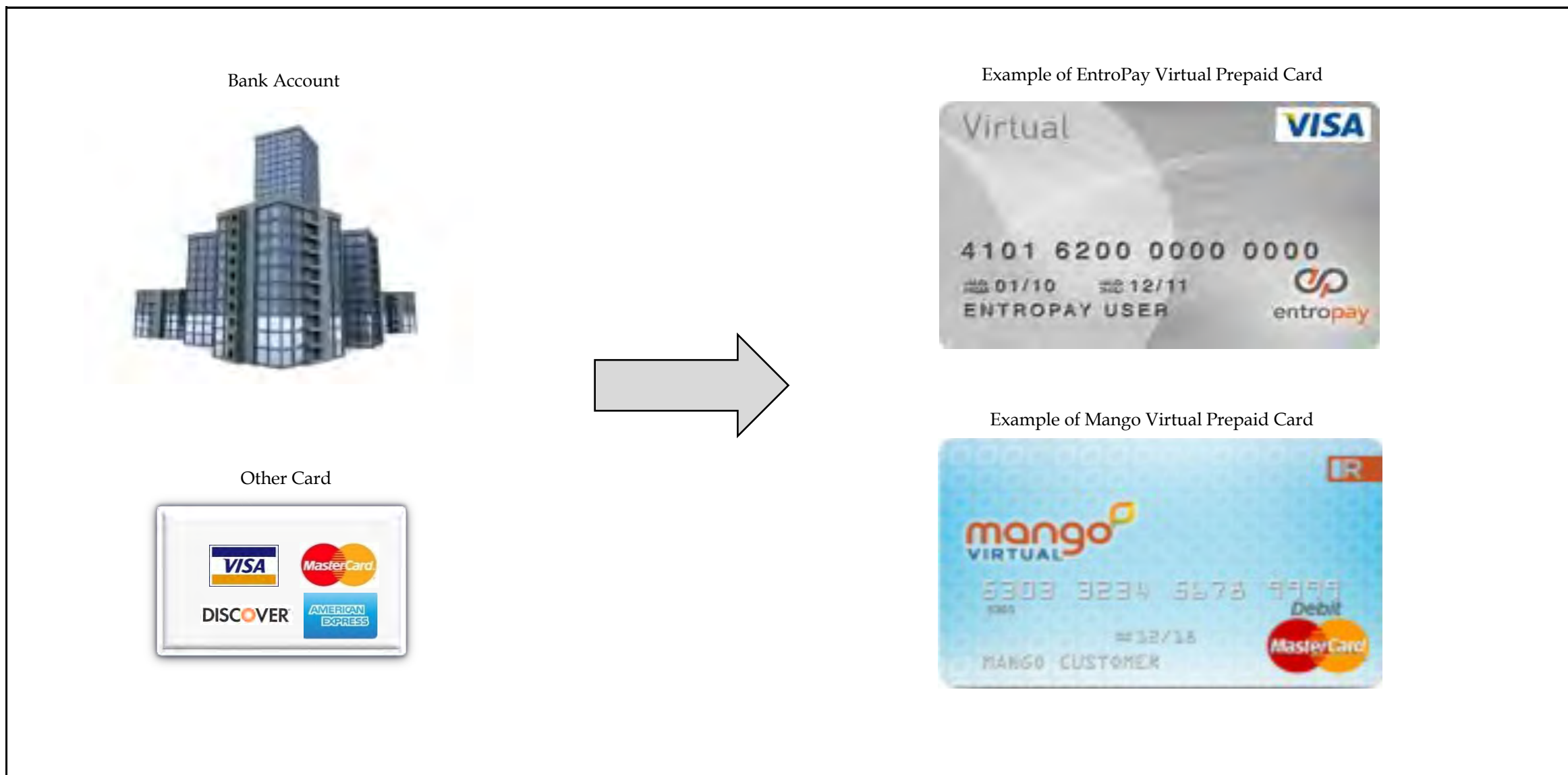


Source:

“RBC Virtual Visa Debit.” Royal Bank of Canada. <<http://www.rbcroyalbank.com/products/deposits/virtual-visa-debit.html>> (accessed 26 Sept. 2014).

Exhibit 9

Credit: Virtual Reloadable Prepaid Card

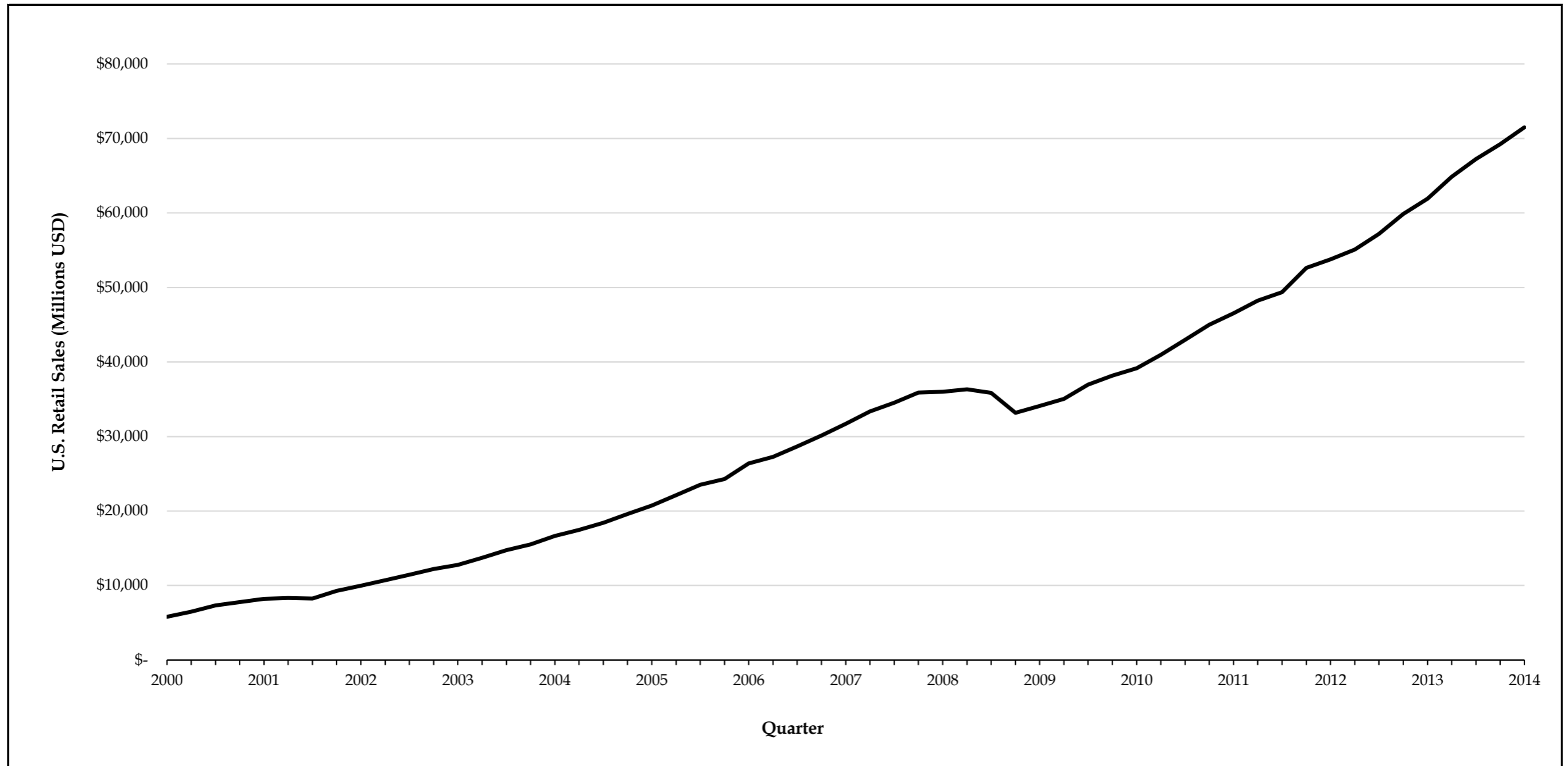


Sources:

-“Prepaid Virtual Visa Card.” EntroPay. <<https://www.entropay.com/prepaid-virtual-visa>> (accessed 19 Sept. 2014).

-“What is Mango?” Mango. <<https://www.mangomoney.com/what-is-mango>> (accessed 19 Sept. 2014).

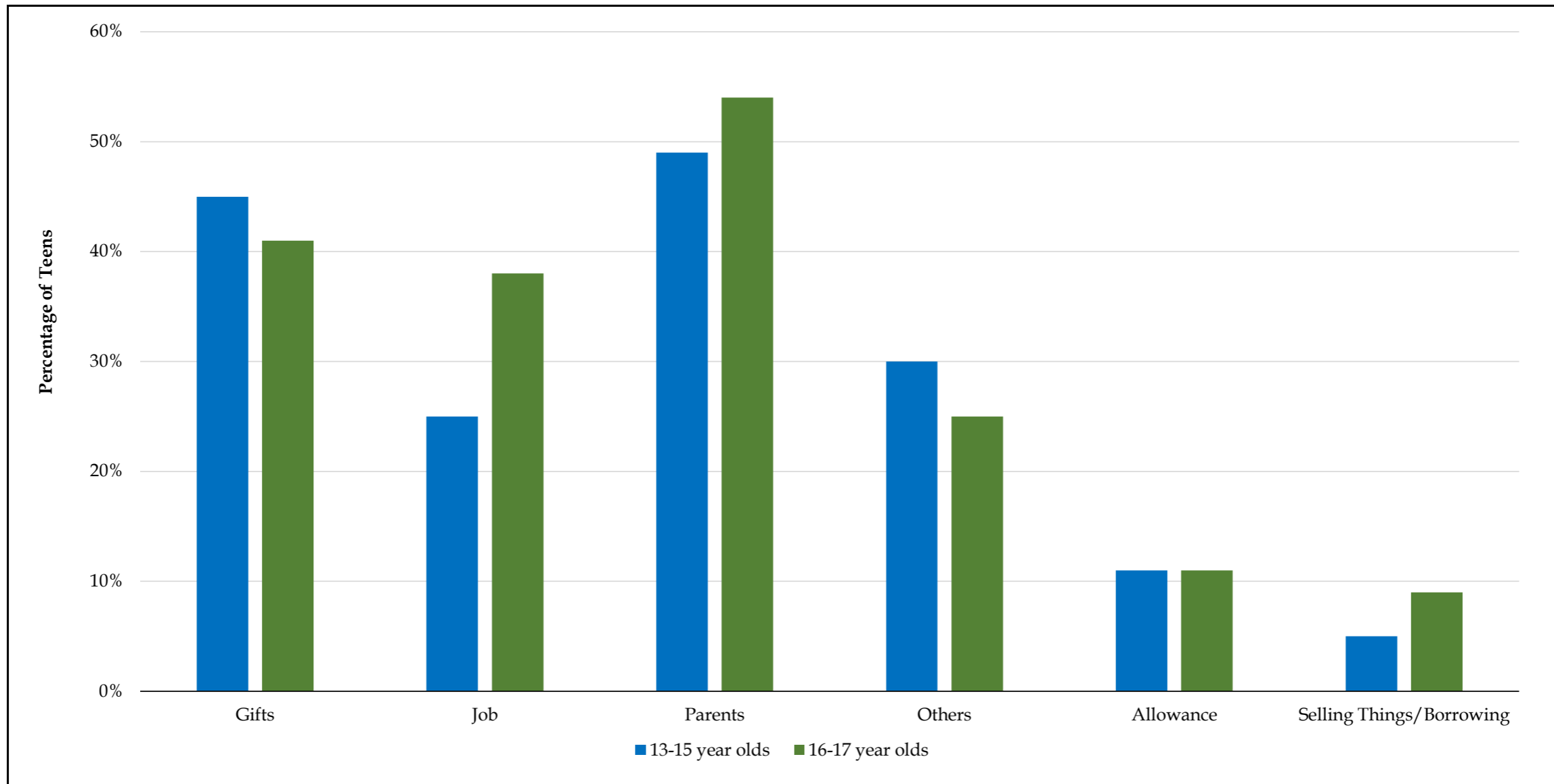
Exhibit 10
Growth in E-commerce
1Q 2000 - 1Q 2014



Note:
 1. E-commerce is defined by the U.S. Census Bureau as "sales of goods and services where an order is placed by the buyer or price and terms of sale are negotiated over an Internet, extranet, Electronic Data Interchange (EDI) network, electronic mail, or other online system. Payment may or may not be made online."

Source:
 "Estimated Quarterly U.S. Retail Sales (Adjusted): Total and E-commerce." *Retail Indicators Branch*. U.S. Census Bureau, 15 Aug. 2014.
 <<http://www.census.gov/retail/mrts/www/data/excel/tsadjustedsales.xls>> (accessed 16 Sept. 2014).

Exhibit 11a Sources of Income for Teens



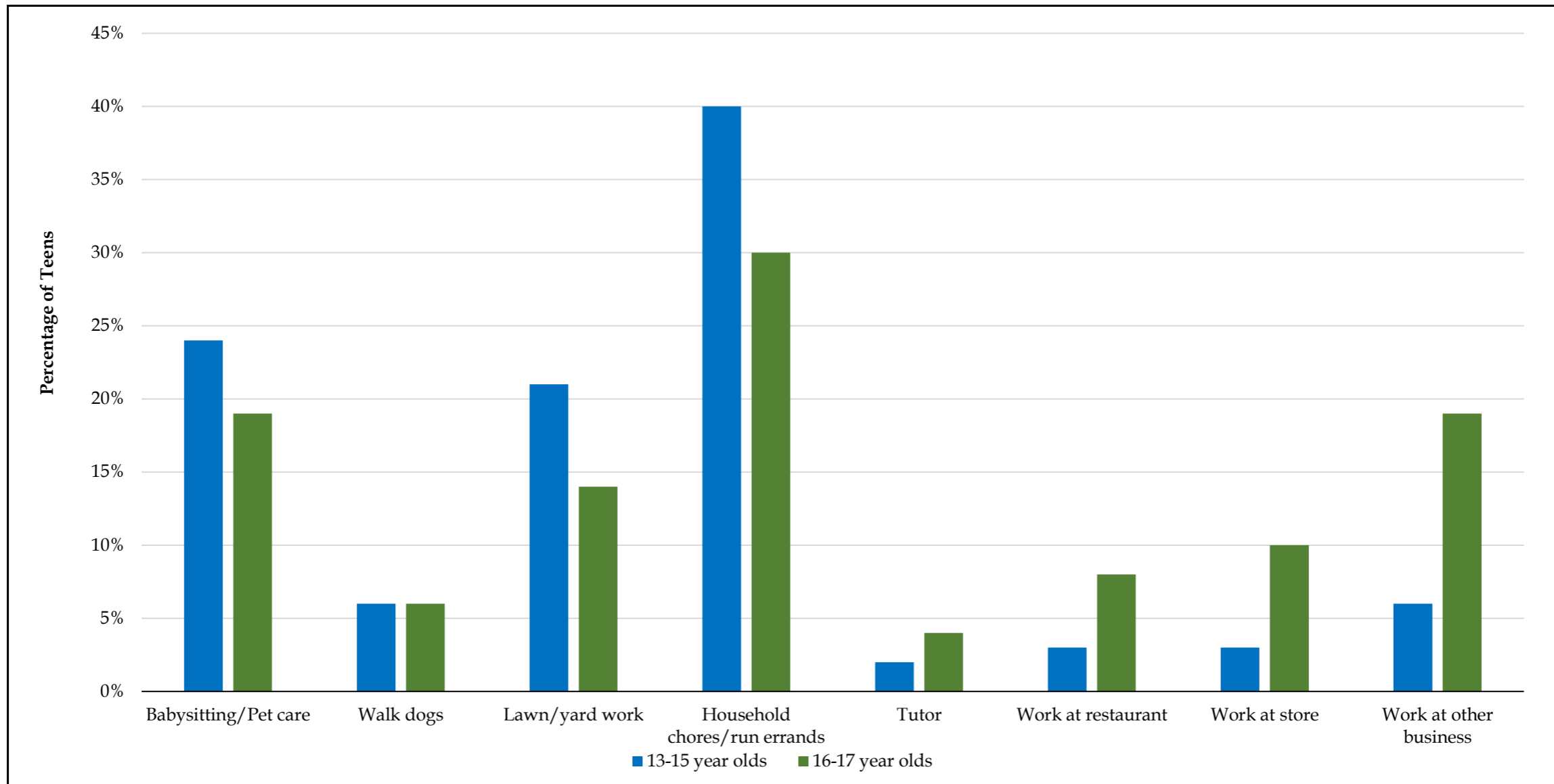
Notes:

1. Teens can have more than one source of income, thus numbers in this graph add up to more than 100%.
2. The data used to produce this graph was taken from the data tables that accompany the source. These can be accessed by clicking on the "Show Text Version" tab on the webpage.
3. The data from this source is from 2011.

Source:

"Money Management for Teens." Bank of America. <<https://www.bankofamerica.com/deposits/manage/money-management-for-teens.go>> (accessed 26 Aug. 2014). Data from tables.

Exhibit 11b How Teens Earn Money



Notes:

1. Teens can earn money in more than one way, thus numbers in this graph add up to more than 100%.
2. The data used to produce this graph was taken from the data tables that accompany the source. These can be accessed by clicking on the "Show Text Version" tab on the webpage.
3. The data from this source is from 2011.

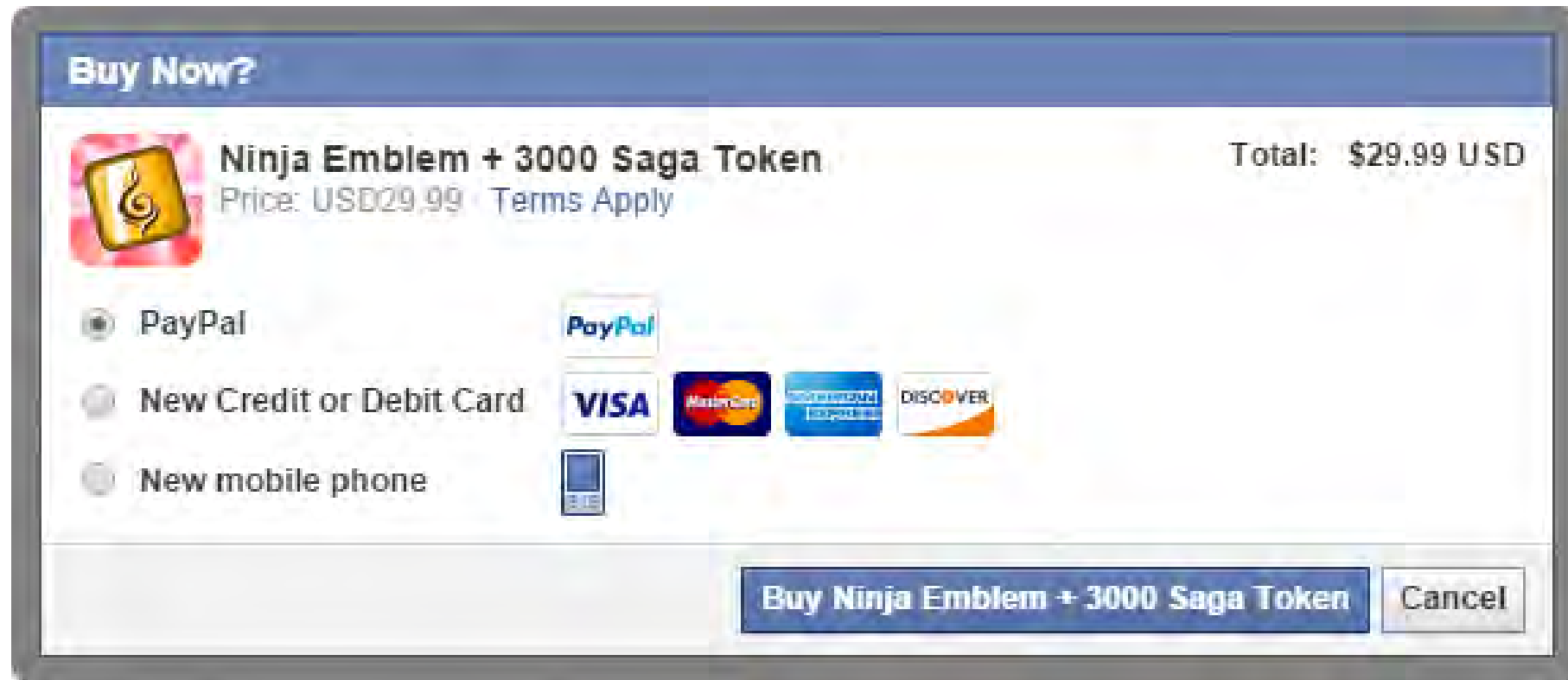
Source:

"Money Management for Teens." Bank of America. <<https://www.bankofamerica.com/deposits/manage/money-management-for-teens.go>> (accessed 26 Aug. 2014). Data from tables.

Exhibit 12

Facebook Pay Dialog

2014 Pay Dialog for Ninja Saga In-Game Purchase



Source:

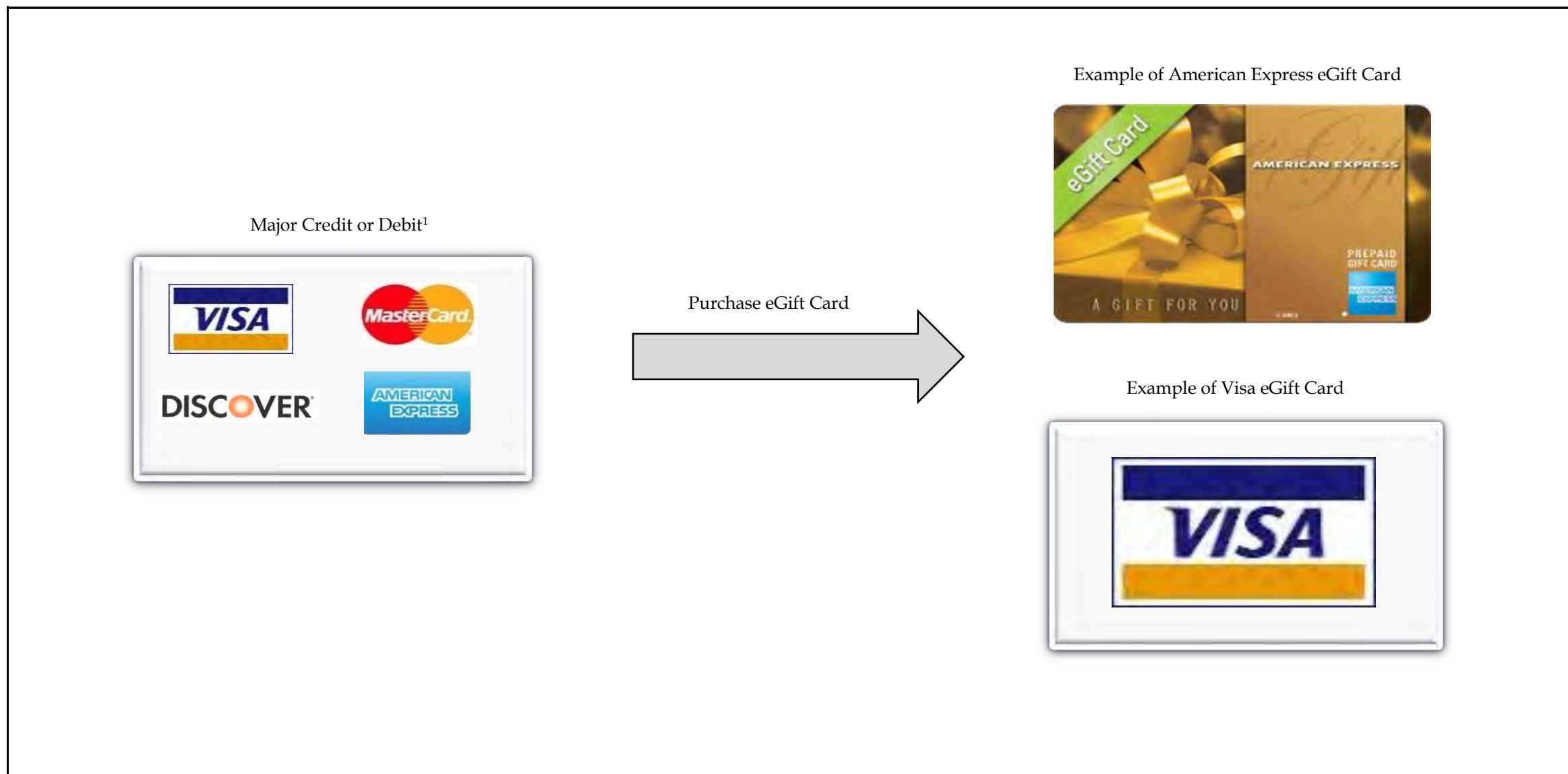
"Ninja Saga." Facebook App. Emagist. <https://apps.facebook.com/ninjasaga/?fb_source=bookmark&ref=bookmarks&count=0&fb_bmpo=s=_0> (accessed 3 Oct. 2014).

EXHIBIT 13

REDACTED

Exhibit 14

Credit: Virtual Gift Card



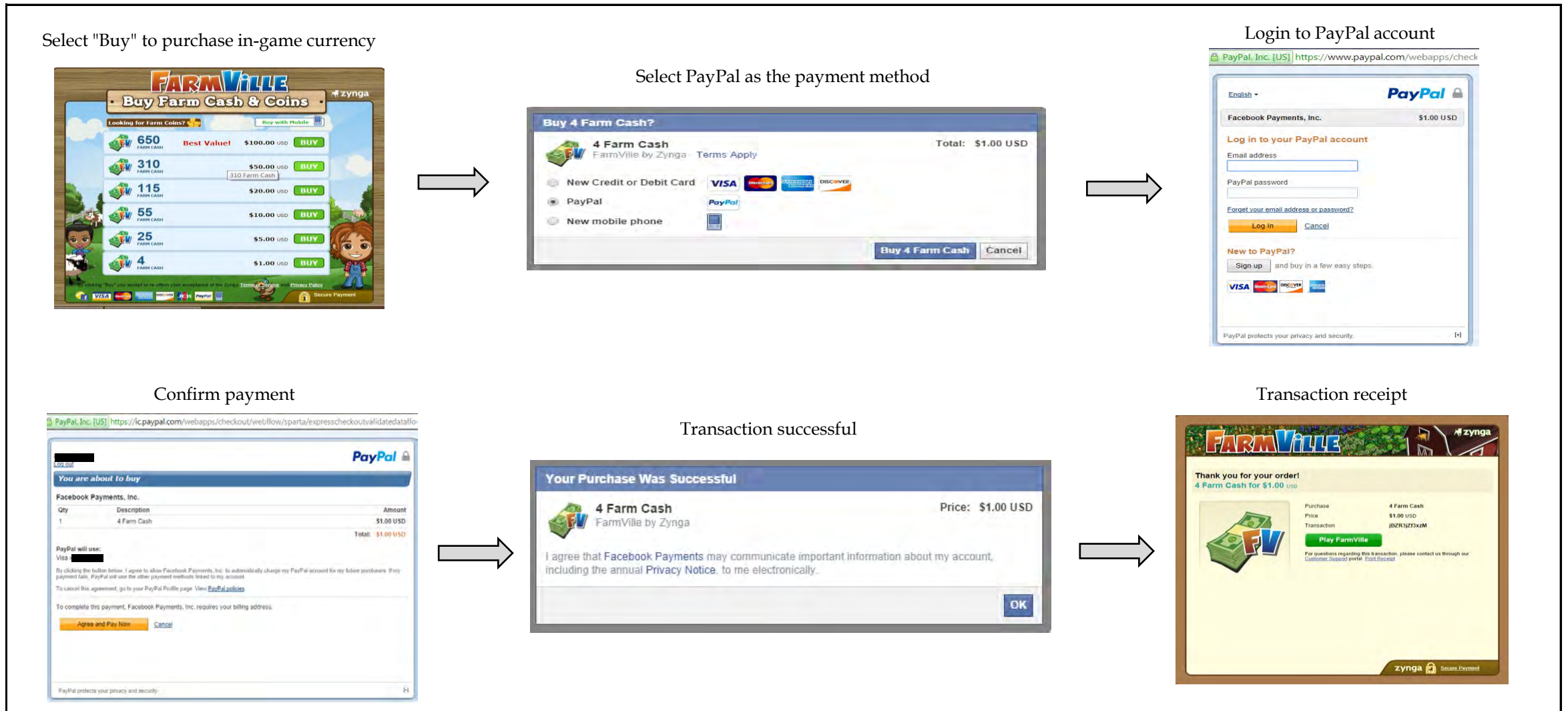
Note:

1. Virtual gift cards (also commonly referred to as "eGift Cards") can be purchased online with Visa, MasterCard, Discover, or American Express cards.

Sources:

- "eGift Cards from American Express." American Express. <https://www311.americanexpress.com/BOLVGCWeb/vgcfOrder.do?request_type=orderProduct&promotion=AG01&program=AVCWEB&selleracntnr=US001-EGIFT&producttypecd=AV> (accessed 19 Sept. 2014).
- "Virtual Gift Cards." GiftCards.com. <<https://www.giftcards.com/virtual-gift-cards>> (accessed 19 Sept. 2014).
- "FAQ." GiftCards.com. <<http://www.giftcards.com/faq>> (accessed 6 Oct. 2014).

Exhibit 15 PayPal: Buy with PayPal

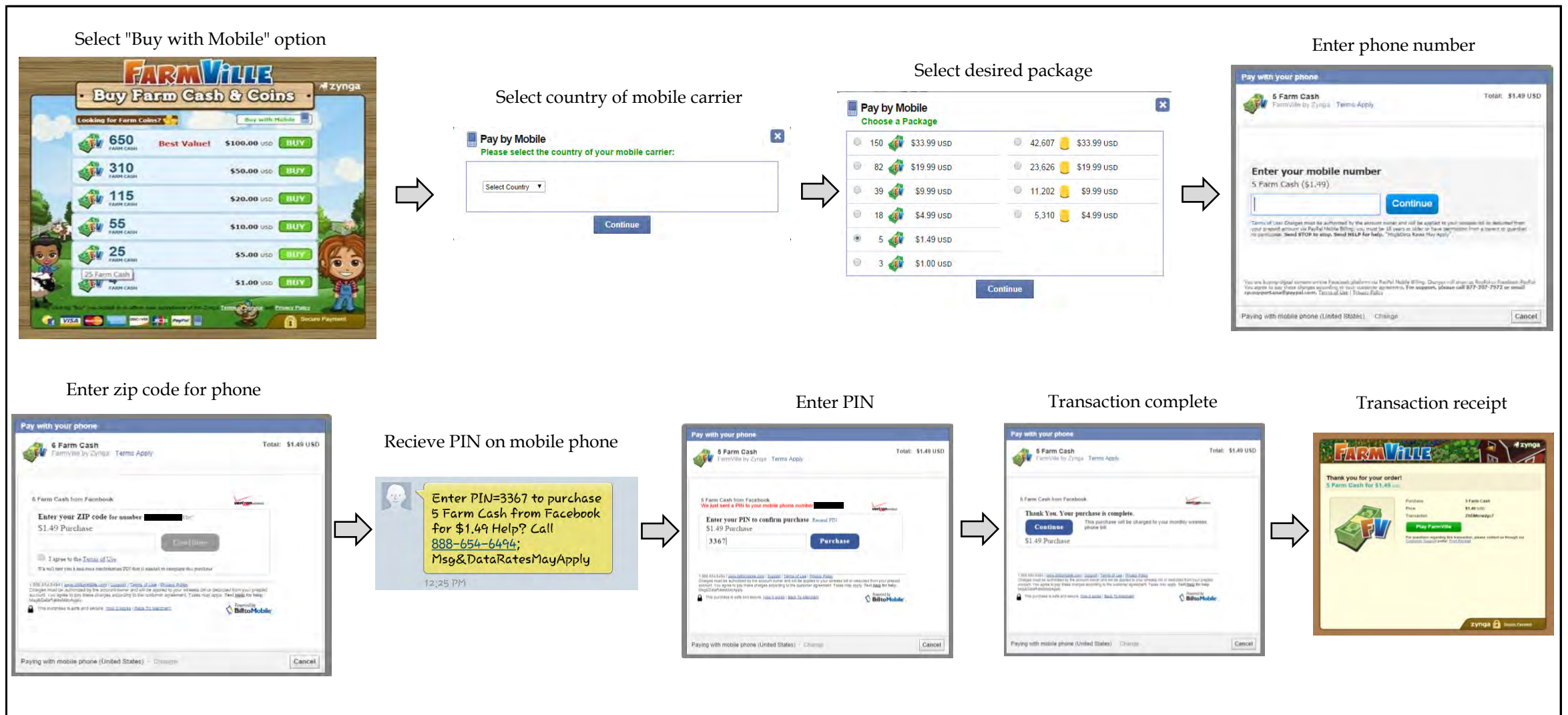


Source:

"FarmVille Buy Farm Cash & Coins." Facebook App. Zynga.

<https://apps.facebook.com/onthefarm/money.php?ref=tab&_force_sn=1&zyUid=hSL_v5fmYnQcaFVv13UeNg.3SIsxoGsdzCebMIUbXojkw&zySnuid=hSL_v5fmYnQcaFVv13UeNg.3SIsxoGsdzCebMIUbXojkw&zySnid=1&zySig=013cd2b906f6085e38e9ef620da3e2e7&snapi_auth=39f551ee3a2952748e102289934178af> (accessed 30 Sept. 2014).

Exhibit 16 Mobile: Buy with Mobile



Source:

"FarmVille Buy Farm Cash & Coins." Facebook App. Zynga.

<https://apps.facebook.com/onthefarm/money.php?ref=tab&_force_sn=1&zyUid=hSl_v5fmYnQcaFVkl3UeNg.3SIsxoGsdzCebMIUbXojkw&zySnuid=hSl_v5fmYnQcaFVkl3UeNg.3SIsxoGsdzCebMIUbXojkw&zySnid=1&zySig=013cd2b906f6085e38e9ef620da3e2e7&snapi_auth=39f551ee3a2952748e102289934178af> (accessed 30 Sept. 2014).

Exhibit 17a Correct BIN Checks

Personal Credit Card



BIN Check: **Correct**

Bin: 446539
Card Brand: VISA
Issuing Bank: WELLS FARGO BANK N.A.
Card Type: CREDIT
Card Level: CLASSIC
Iso Country Name: UNITED STATES
Iso Country A2: US
Iso Country A3: USA
Iso Country Number: 840
Bank's website: www.wellsfargo.com
Customer Care Line: 1-800-642-4720

Personal Debit Card



BIN Check: **Correct**

Bin: 480990
Card Brand: VISA
Issuing Bank: CHARLES SCHWAB BANK
Card Type: DEBIT
Card Level: CLASSIC
Iso Country Name: UNITED STATES
Iso Country A2: US
Iso Country A3: USA
Iso Country Number: 840
Bank's website: www.schwabbank.com

Source:

“Bin Database – Credit Card Bin Checker.” BinDB. <<https://www.bindb.com/bin-database.html>> (accessed 3 Oct. 2014).

Exhibit 17b
Incorrect BIN Checks

Masked Card¹



BIN Check: **Incorrect**

Bin: 552942
 Card Brand: MASTERCARD
 Issuing Bank: WRIGHT EXPRESS FINANCIAL SERVICES CORPORATION
Card Type: CREDIT
 Card Level: BUSINESS
 Iso Country Name: UNITED STATES
 Iso Country A2: US
 Iso Country A3: USA
 Iso Country Number: 840
 Bank's website: www.wrightexpress.com
 Customer Care Line: 207-773-8171

Reloadable Prepaid Card



BIN Check: **Incorrect**

Bin: 375171
 Card Brand: AMEX
 Issuing Bank: AMERICAN EXPRESS
Card Type: CREDIT
 Card Level:
 Iso Country Name: FINLAND
 Iso Country A2: FI
 Iso Country A3: FIN
 Iso Country Number: 246
 Bank's website: www.americanexpress.com
 Customer Care Line: (09) 6132 0400

Note:

1. Although Masked Cards are issued with credit card BIN numbers, they function as prepaid gift cards. These cards can be incorrectly categorized in BIN databases.

Sources:

- “Bin Database – Credit Card Bin Checker.” BinDB. <<https://www.bindb.com/bin-database.html>> (accessed 3 Oct. 2014).
- “What are Masked Cards?” Abine. <<https://dnt.abine.com/#help/faq/faq-whatAreMaskedCards>> (accessed 6 Sept. 2014).

Exhibit 18

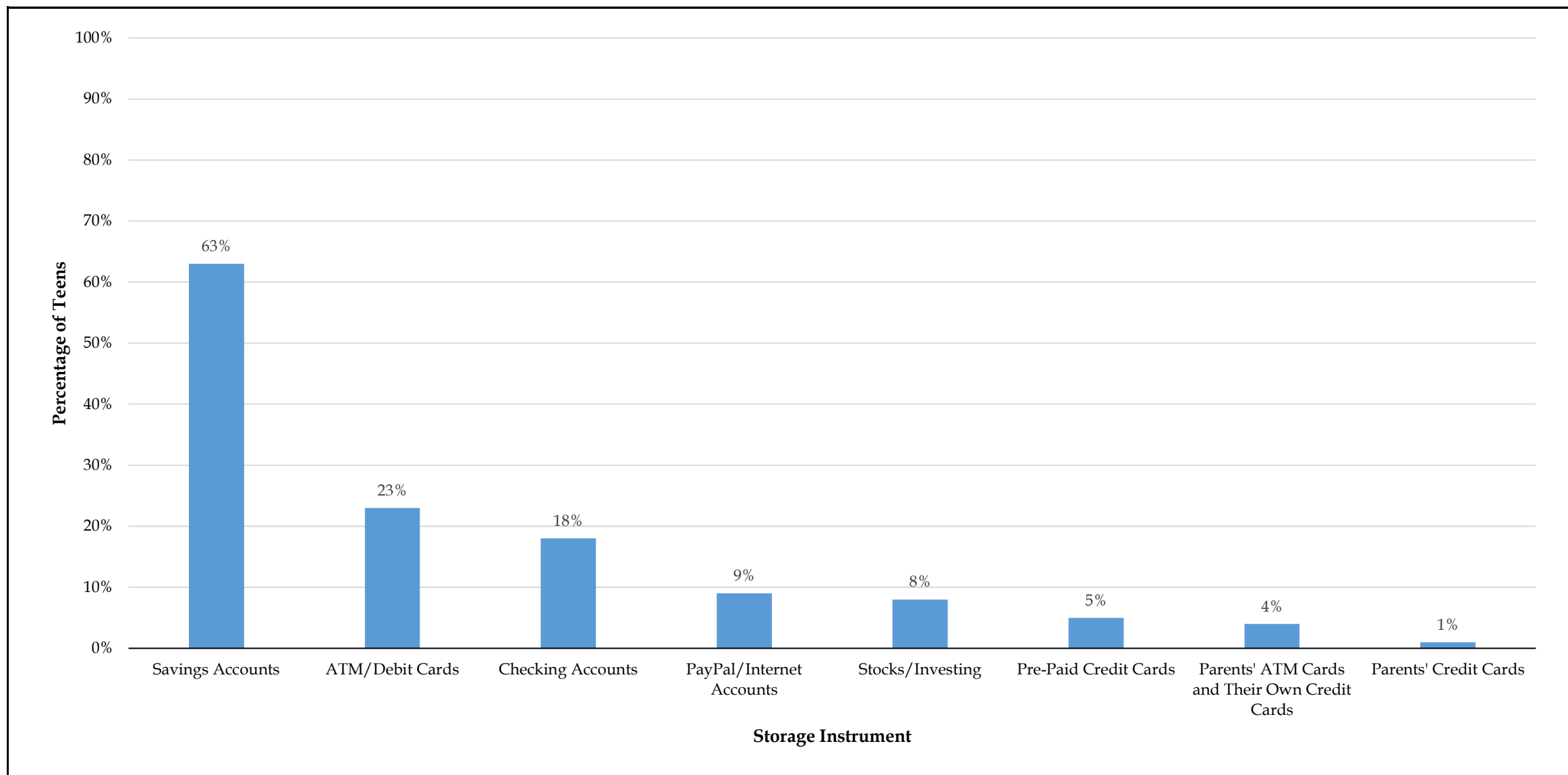
Payment Instrument
Spectrum of Control by Teenagers



Notes:

- Complete Control:** Ability to make purchases using one’s own funds without input or approval from parents or a party known to them.
- Effective Control:** Ability to make purchases using funds in an account under one’s own name or using a manner of payment in one’s own name, but where regulatory restrictions may require an adult to also be listed on account.
- Ambiguous Control:** Ability to make purchases due to discussions and associated permission but using a form of payment exclusively in the name of parent or other third party.

Exhibit 19 Where Teens Store Money



Notes:

1. These figures depict the percentage of teens that store money in each instrument. It is possible for teens to store money across multiple instruments, resulting in a total of more than 100 percent.
2. The data from this source is from 2011.

Source:

“Money Management for Teens.” Bank of America. <<https://www.bankofamerica.com/deposits/manage/money-management-for-teens.go>> (accessed 26 Aug. 2014).

Cardholder Agreement with Minor Provision



PLATINUM VISA[®] AGREEMENT AND DISCLOSURE STATEMENT

In this Agreement, the words *you* and *your* mean each and all of those who apply for the account or who sign this Agreement. *Card* means the Visa Credit Card and any duplicates and renewals we issue. *Account* means your Visa Line of Credit Account with us. *We, us, and ours* mean this credit union.

1. RESPONSIBILITY If we issue you a card, you agree to repay all debts and the FINANCE CHARGE arising from the use of the card and the card Account. For example, you are responsible for charges made by yourself, your spouse, and minor children. Use of the card by anyone else will be presumed to be with your consent. You will be considered responsible for all resulting charges. You must notify us in writing of possible unauthorized use. To protect your rights, we must hear from you no later than 60 days after we sent the first statement on which the unauthorized use appeared. Your obligation to pay the Account balance continues even though an agreement, divorce decree, or other court judgment to which we are not a party may direct you or one of the other persons responsible to pay the Account. Any and all persons signing on the account are entitled to a card upon request. You agree that all transactions that you initiate by use of the Card are legal in the jurisdiction where you live and/or the transaction occurs. You agree to repay according to the terms of this Agreement all transactions you initiate by use of the Card.

2. CREDIT LINE If we approve your application, we will establish a self-replenishing Line of Credit and notify you of its amount when we issue the card. You agree not to let the Account balance exceed this approved Credit Line. Each payment will restore your Credit Line by the amount of the payment (excluding any over limit amount); however, SAFE at its sole and absolute discretion, reserves the right to delay the restoration of your Credit Line for up to 15 days. Finance charges and other charges will cease to accrue on the amount of payment as of the date of receipt. You may request an increase in your Credit Line by calling SAFE's Call Center or by visiting any SAFE branch. By giving you written notice, your Credit Line may be reduced from time to time, or with good cause, your card may be revoked and this Agreement terminated. Good

6. CREDITS Merchants who honor your card and give you credit for returns or adjustments will provide us with a credit which we will post to your Account. If your credits and payments exceed what you owe us, we will apply this credit balance against future purchases and cash advances, or refund it upon your written request if it is \$1 or more. Any credit balance not cleared within 30 days will be transferred to your Share Savings Account.

7. FOREIGN TRANSACTION EXCHANGE RATE The exchange rate between the transaction currency and the billing currency used for processing international transactions is a rate selected by Visa from the range of rates available in wholesale currency markets for the applicable central processing date, which may vary from the rate Visa itself receives, or the government-mandated rate in effect for the applicable central processing date.

8. FOREIGN TRANSACTION FEE A fee of up to 1 percent of the transaction amount is charged for transactions conducted outside the United States.

9. PLAN MERCHANT DISPUTES We are not responsible for the refusal of any plan merchant or financial institution to honor your card. We are subject to claims and defenses (other than tort claims) arising out of goods or services you purchase with the card only if you have made a good faith attempt, but have been unable to obtain satisfaction from the plan merchant, and: (a) your purchase was made in response to an advertisement we sent or participated in sending you; or (b) your purchase cost more than \$50 and was made from a plan merchant in your state or within 100 miles of your home. You must resolve any other disputes directly with the plan merchant.

Notes:

1. Annotated document.
2. Identical language can be found in the cardholder agreements for the following SAFE Credit Union-issued credit cards: Platinum Rewards Visa, Platinum Cash Rewards Visa, Partner for Change Visa, Share Secured Visa, and Student Visa.

Source:

"Platinum Visa Agreement and Disclosure Statement." SAFE Credit Union, 28 Aug. 2013. PDF File.
<https://www.safecu.org/Credit_Cards/pdfs/Platinum_S628V.pdf>.

Appendix A

Curriculum Vitae



Ethan Cohen-Cole PhD, MPA, MA

Managing Director

Financial Services Practice Lead

2040 Bancroft Way, #200

Berkeley, CA 94704

Tel: (415) 889-7639

ecohencole@econone.com

Ethan Cohen-Cole is a Managing Director with Econ One Research. Dr. Cohen-Cole is an expert in consumer credit, consumer payments, credit cards, payment systems, financial regulation, structured finance (RMBS, CMBS, CDS, CLN etc.), financial markets, econometric methods, banking, capital markets, analysis of networks, and systemic risk. As a former finance professor, Dr. Cohen-Cole has taught executive, MBA, Masters in Finance and undergraduates in a range of topics including corporate finance, macroeconomics, valuation, financial risk management, banking, and financial institution management.

Dr. Cohen-Cole has more than 17 years of experience in financial services, litigation consulting and bank supervision, including experience with the Federal Reserve System as a bank regulator, and as a policy and regulation expert. Dr. Cohen-Cole has worked with clients across the world such as central banks, including the Bank of France, the Bank of Austria, the Central Bank of Brazil, and the Bank for International Settlements. His financial sector clients have included the largest multinational banks in the US and Europe. Broadly experienced, Dr. Cohen-Cole has worked on client engagements in more than 25 countries in Europe, Asia, Africa, and North and South America.

Dr. Cohen-Cole has also been an invited visitor or speaker at more than 175 professional and academic seminars and training sessions. These have included Federal Reserve System, Central Bank of Chile, Bank for International Settlements, Bank of France, Bank of Austria, European Economic Association, Chicago/London Conferences on Financial Markets, Financial Management Association (US and Europe), RiskMinds Europe, University of California - Berkeley, Harvard University, FDIC, European Central Bank Bank of Italy, American Finance Association, American Economic Association, and Cambridge University.

Dr. Cohen-Cole has also been closely involved with the creation of financial sector regulations. He was a steering committee member of the Center for Financial Policy at the University of Maryland, served on an advisory committee to the BIS in the drafting of Basel I and II, and served as an advisor to three central banks on systemic risk management.

As a professor, he has written widely on topics including commodities markets, municipal bond markets, systemic risk, and financial markets in general. Publications include *Journal of Financial Economics*, *Journal of Banking and Finance*, *Review of Economics and Statistics*, *Journal of Macroeconomics*, *American Law and Economic Review*, *Journal of Health Economics*, and *Economic Letters*.

RECENT PROFESSIONAL HISTORY

Econ One Research <i>Managing Director, Financial Services Practice Lead</i>	2013-Present
Alvarez & Marsal <i>Managing Director</i>	2012-2013
NERA Economic Consulting <i>Special Consultant</i>	2010-2012
University of Maryland <i>Finance Professor</i>	2009-2012
Federal Reserve Bank of Boston <i>Financial Economist, Bank Supervisor</i>	2006-2009

EDUCATION

Harvard University <i>BA, History</i>
Princeton University <i>MPA, Public Policy</i>
University of Wisconsin- Madison <i>MA, Economics</i>
University of Wisconsin- Madison <i>Ph.D, Economics</i>

BOARD MEMBERSHIP

El Camino Hospital <i>Investment Committee</i>	2012- Present
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SELECT AREAS OF EXPERTISE

Credit Cards	Capital Markets
Consumer Credit	Foreign Exchange
Consumer Payments	Operational Risk
Payment Systems	Repo Markets, Securities Lending
Structured Finance (CDO, RMBS, CLN, etc.)	Macroeconomics
Derivatives	Merchant Acquiring
Risk Management	Bank Regulation and Supervision
Pricing Models	Systemic Risk
OTC Markets	Credit Risk
High Frequency / Algorithmic Trading	Commodities Markets
Market Risk	Macro Prudential Regulation
Advisor to BIS for Basel II Creation	

PUBLICATIONS

CONSUMER CREDIT

- “Who Gets Credit after Bankruptcy and Why? An Information Channel?” with Burcu Duygan-Bump & Judit Montoriol, **Journal of Banking and Finance**, 2013.
- “Consumer Credit Delinquencies: Why Do Some Choose Credit Cards over Mortgages?” **Filene Research Institute**, 2010.
- “The Option Value of Consumer Bankruptcy,” **Federal Reserve Bank of Boston Working Paper QAU 09-1**, 2009.
- “Your House or Your Credit Card, Which Would You Choose? Personal Delinquency Tradeoffs and Economic Spillovers,” with Jonathan Morse, **Federal Reserve Bank of Boston Working Paper QAU 09-5**, 2009.
- “Credit Card Redlining,” **Federal Reserve Bank of Boston Working Paper No. QAU08-1**, 2008.

FINANCIAL SERVICES LITIGATION AND WHITE PAPERS

- “Stress Testing and Economic Capital: An Integrated Framework,” with Matt Sekerke & James Zuberi, **GARP**, 2013.
- “Is Mortgage Underwriting to Blame for Subprime Losses? Disentangling the Effects of Poor Underwriting From the Economic Downturn,” with Paul Hinton, **NERA Economic Consulting**, 2011.
- “Understanding Municipal Bond Arbitrage,” with Shuchi Satwah, **NERA Economic Consulting**, 2011.
- “Consumer Credit Delinquencies: Why Do Some Choose Credit Cards over Mortgages?” **Filene Research Institute**, 2010.
- “Institution-Specific Systemic Risk Assessment Methodology,” with Chris Laursen, **NERA Economic Consulting**, 2010.
- “Consumer Protection and Regulatory Changes in the Dodd-Frank Bill,” **NERA Economic Consulting**, 2010.

MACROECONOMICS

- “Monetary Policy and Capital Regulation in the US and Europe,” with Jonathan Morse, **International Economics**, 134, 2013.
- “Nonlinearities in Growth: From Evidence to Policy,” with Steven Durlauf & Giacomo Rondina, **Journal of Macroeconomics**, 34(1), 2012.
- “Does the Financial Sector Impact the Real Economy? Evidence from the Commercial Paper Market during the 2007-2008 Financial Crisis,” with Judit Montoriol, Gustavo Suarez & Jason Wu, **University of Maryland Working Paper**, 2012.
- “The Balance Sheet Channel,” with Enrique Martinez-Garcia, **Financial Stability, Monetary Policy, and Central Banking, Santiago: Bank of Chile**, 2011.
- “In Noise We Trust? Optimal Monetary Policy with Random Targets,” with Bogdan Cosmaciuc, **FRBB Research Department Working Paper 06-14**, 2006.
- “Note on Investment Patterns Across Countries: What do we Have Left to Learn From Aggregate Data?” **University of Wisconsin - Madison, Dissertation**, 2006.

SYSTEMIC RISK AND FINANCIAL INSTITUTIONS

- “Trading Networks and Liquidity Provision,” with Andrei Kirilenko & Eleonora Patacchini, **Journal of Financial Economics**, 2014.
- “The Use of ABX Derivatives in Credit Crisis Litigation,” with Faten Sabry, **Journal of Structured Finance**, 2014.
- “Strategic Interactions on Financial Networks for the Analysis of Systemic Risk,” Handbook of Systemic Risk, with Andrei Kirilenko & Eleonora Patacchini, **Cambridge University Press**, 2013.
- “Systemic Risk and Network Formation in the Interbank Market,” with Eleonora Patacchini & Yves Zenou, **CAREFIN Working Paper 25/2010**, 2012.
- “Asset Liquidity, Debt Valuation and Credit Risk,” **Federal Reserve Bank of Boston Working Paper QAU 07-5**, 2007.
- “Loss Distribution Estimation, External Data and Model Averaging,” with Todd Prono, **Journal of Financial Risk Management**, 2007.

ECONOMETRIC METHODS

- “Multivariate Choice and Identification of Social Interactions,” with Xiaodong Liu & Yves Zenou, **Journal of Econometrics**, 2nd round revision, 2012.
- “Model Uncertainty and the Deterrent Effect of Capital Punishment,” with Steven Durlauf, Jeffrey Fagan & Daniel Nagin, **American Law and Economic Review**, 2009.
- “Is Obesity Contagious? Social Networks vs. Environmental Factors in the Obesity Epidemic,” with Jason Fletcher, **Journal of Health Economics**, 27(5), 2008.
- “Are All Health Outcomes ‘Contagious’? Detecting Implausible Social Network Effects in Acne, Height, and Headaches,” with Jason Fletcher, **British Medical Journal**, 337, 2008.
- “Unpacking Social Interactions,” with Giulio Zanella, **Economic Inquiry**, 46(1), 2008.
- “Multiple Groups Identification in the Linear-in-Means Model,” **Economics Letters**, 92(2), 2006.
- “Loss Distribution Estimation, External Data and Model Averaging,” with Todd Prono, **Journal of Financial Risk Management**, 2007.

LITIGATION SUPPORT EXPERIENCE

Testifying Expert

Expert Report Submitted and Case Settled:

- For defense counsel in connection with credit card processing contracts and US consumer payment systems.
- Matter relating to insolvency for large financial institution.
- Loan loss reserves methods for large financial institution in SEC investigation.
- SEC in case related to fraudulent reporting.
- RMBS securities matter.

Expert Report Submitted, Deposed and Case Settled:

- Structured product insurer in dispute related to Commercial Real Estate CDO valuation and waterfall issues.
- Materiality expert for defense counsel related to RMBS securities matter in Federal Court.

Expert Report Submitted and Case Pending:

- Investment fund in life insurance claims dispute.

Expert Report Submitted, Deposed and Case Pending:

- Suitability issues in structured product: Issuance of credit linked note, CDO, CDS, and CDO.
- Damages in matter relating to performance standards for investment fund.

Expert Reports Pending:

- Case related to dispute on liability in payments system.
- Case related to quantification of reputational costs in investment banking.
- Case related to CDO acceleration and liquidation dispute.
- Case related to regulation of overseas sales of US securities.
- Case related to distressed debt trading.
- Investment fund in life insurance claims dispute.
- Various RMBS insurance put-back matters.
- Various RMBS securities matters.
- Trade secrets case in distressed asset industry.

Testified in Superior Court and Case Closed:

- Criminal matter in payments industry.

Deposed and Testified in Arbitration Case:

- Evaluation and rebuttal of expert damages calculation in matter related to healthcare payments.

Consulting Expert

Case Pending:

- Industry background and case support for matter relating to US payment systems.
- Evaluation of determinants of profitability in high frequency / algorithmic trading in intellectual property matter.
- Support for coordination, analytic methods and legal strategy in > \$1bn financial services derivative matter.
- Support in coordination, analytic methods and strategy for case relating to trustee and custodian mismanagement of ABCP facility.
- Support for case relating to fraudulent transfer in RMBS structured product conduit.
- Consumer finance analytics for case relating to Ponzi scheme.
- Analytics for case relating to benefit payments from bankrupt corporate entity.
- Analytic and research support to European central bank investigation of banking sector.
- Detailed analytics of European regulatory standards and review of investment details.

Detailed Econometric Analysis:

- Detailed evaluation of mortgage portfolio to evaluate allegations of underwriting standard violations, and reps and warranties.
- Structured mortgage portfolio (RMBS) valuations in damages settlement related to allegations of mispricing of securities. Case settled.
- Portfolio valuations on structured products (RMBS, CDOs) based on macroeconomic trends in mortgage insurance dispute. Case settled.

- Analytical support and consulting advice to mid-sized fund on funds.
- Analytic support in bankruptcy matter relating to valuation.

Regulatory commentary and White Papers:

- Systemic risk measurement and analysis as applied to insurance industry.

Selected Client Experience – Financial Services

- Constructed new credit score card system for general commercial lending, shipping and manufacturing to Den Norske Bank.
- Construction of full suite of risk management models for use in stress testing by mid-sized midwestern US regional bank.
- Development of MSR portfolio valuation tools for use by US regional bank.
- Development of CRE and commercial loan risk assessment tools for southern US regional bank.
- Supported framework development by Bank for International Settlements and industry of BASEL I banking regulations.
- Due diligence on mid-market and retail companies for hedge funds, investment companies and corporates.
- Provided pricing tools for a debt collection investor for investment purposes.
- Provided training program on methods, measurement and regulatory approaches for systemic risk to Bank of Austria and Eurosystem.
- Built quantitative tools for large charity organization which auctioned / sold commodities as part of USAID Title II programs.
- Provided macroeconomic and technical support to research division and payments group at Bank of France on systemic risk analysis and regulation in post-crisis environment.
- Provided technical support and oversight to New York City Department of Consumer Affairs on large-scale survey of financial product usage.
- Provided comprehensive enterprise risk management program to Bancomer including asset liability management, deposit sensitivity analysis, and interest rate risk analysis.
- Delivered framework for asset-liability management and interest rate risk analysis to Bank of Montreal.
- Constructed first large bank operational risk framework (1995) for measurement and management to Union Bank of Switzerland.
- Provided methodology and system for analysis of sovereign debt to World Bank and Bank of Brazil.

Comprehensive Publication List: 2004 – Present

Academic Journals

- Banerjee, Ritesh, and Ethan Cohen-Cole. "Competition and the Cost of Health Care." *Applied Economics* 44.10 (2012): 1201-1207. Web. <http://www.tandfonline.com/doi/abs/10.1080/00036846.2010.539537#.U_fcS_lDVds>.
- Cohen-Cole, Ethan. "Housing Quality, Neurotoxins and Human Capital Acquisition." *Applied Economics Letters* 13.12 (2006): 753. Web. <http://www.tandfonline.com/doi/abs/10.1080/13504850500407566#.U_fQgflVds>.
- ---. "Multiple Groups Identification in the Linear-in-Means Model." *Economics Letters* 92.2 (2006): 157-62. *Social Science Research Network*. Web. <<http://ssrn.com/abstract=920824>>.
- ---. "Consumer Credit Delinquencies: Why Do Some Choose Credit Cards over Mortgages?" Filene Research Institute (2010). Research Brief. Web. <http://filene.org/assets/pdf-reports/222_CohenCole2.pdf>.
- ---. "Consumer Protection and Regulatory Changes in the Dodd-Frank Bill." NERA Economic Consulting (31 August 2010). Web. <http://www.nera.com/nera-files/PUB_FinRegs2_Consumer_Protection_9.2010.pdf>.
- Cohen-Cole, Ethan, Steven Durlauf, Jeffrey Fagan, and Daniel Nagin. "Model Uncertainty and the Deterrent Effect of Capital Punishment." *American Law and Economics Review*, 11.2 (2009): 335-369. Web. <<http://aler.oxfordjournals.org/content/11/2/335.abstract>>.
- Cohen-Cole, Ethan, Steven N. Durlauf, and Giacomo Rondina. "Nonlinearities in Growth: From Evidence to Policy." *Journal of Macroeconomics* 34:1 (Mar. 2012): 42-58. 28 Apr. 2005. Web. <<http://www.ssc.wisc.edu/econ/archive/wp2005-09.pdf>>.
- Cohen-Cole, Ethan, Burcu Duygan-Bump, and Judit Montoriol-Garriga. "Who Gets Credit after Bankruptcy and Why? An Information Channel." *Journal of Banking & Finance* 37.12 (2013): 5101-17. Web. <http://www.cfap.jbs.cam.ac.uk/news/events/2011/downloads/cohen-cole_duygan-bump_who.pdf>.
- Cohen-Cole, Ethan, and Jason M. Fletcher. "Are All Health Outcomes 'Contagious'?" Detecting Implausible Social Network Effects in Acne, Height, and Headaches." *British Medical Journal* (2008): 337: a2533. *Social Science Research Network*. Web. <<http://ssrn.com/abstract=1333901>>.
- ---. "Is Obesity Contagious? Social Networks vs. Environmental Factors in the Obesity Epidemic." *Journal of Health Economics* 27.5 (2008). Web. <<http://www.ncbi.nlm.nih.gov/pubmed/18571258>>.
- ---. "Trading Networks and Liquidity Provision." *Journal of Financial Economics* 113.2 (Aug. 2014): 235-51. Web. <<http://www.sciencedirect.com/science/article/pii/S0304405X14000919>>.
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Appendix B

Documents Relied Upon

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Legal Documents:

1. Defendant Facebook, Inc.'s Answer to Plaintiffs' Third Amend. Class Action Compl. *I.B. et al. v. Facebook, Inc.* (N.D. Cal. Oakland Div. No. CV 12-01894 CW) (Dkt. # 62) (Jan. 17, 2014).
2. Plaintiff I.B.'s Responses to Defendant Facebook, Inc.'s First Set of Interrogatories. *I.B. et al. v. Facebook, Inc.* (N.D. Cal. Oakland Div. No. CV 12-01894 CW) (Mar. 25, 2014).
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Appendix C

Industry Standard Provisions:

Payment Storage Details

Appendix C

Industry Standard Provisions: Payment Storage Details

Company	Company Description	Provision
Facebook	Online social networking service offering users the ability to stay connected with friends and family.	Authority. When you provide a funding instrument to us, you confirm that you are permitted to use that funding instrument. When you fund a transaction, you authorize us (and our designated payment processor) to charge the full amount to the funding instrument you designate for the transaction. You also authorize us to collect and store that funding instrument, along with other related transaction information. ¹
Developer	Company Description	Provision
Electronic Arts	A global interactive entertainment software company offering gaming products and services.	We have adopted this global online Privacy Policy to explain how we store and use personal and non-personal information we collect online on our websites, during your use of our online products and/or services (including online game play) and on mobile platforms. [...] Information collected will vary depending upon the activity and may include your name, email address, phone number, home address, birth date, mobile phone number and credit card information. When you interact with the Services, we collect and store user information as described below. [...]
Idle Gaming	Developer specializing in social casino games available on Facebook and mobile devices.	In connection with your use of the Services, we may ask you for personally- identifying information which can be used to contact or identify you. This may include your: first and last name, password (and similar information that helps us maintain security in account access), date of birth (to verify the age of and/or better understand the demographics of our users), contact information (which may include your email address and/ or phone number), Facebook user name, profile picture, and friend list geographical data, billing information (which includes your credit card information, home and/or business postal addresses) ¹

Note:

1. Original formatting was changed for consistency.

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Appendix C

Industry Standard Provisions: Payment Storage Details (Cont.)

Company	Company Description	Provision
Facebook	Online social networking service offering users the ability to stay connected with friends and family.	Authority. When you provide a funding instrument to us, you confirm that you are permitted to use that funding instrument. When you fund a transaction, you authorize us (and our designated payment processor) to charge the full amount to the funding instrument you designate for the transaction. You also authorize us to collect and store that funding instrument, along with other related transaction information. ¹
Digital Media Store and Developer	Company Description	Provision
Sony Entertainment Network	Digital media delivery platform operated by Sony Group.	We collect the information that you directly provide to us, such as when you enter it on a web page, or include it in an email that you send to us. This type of collection often occurs through our business support processes, such as: Registration or Account Creation Processes, where we ask you to provide information such as: Contact info (e.g. name, email or mailing address, or phone number), Account Administration Info (e.g. user name, password, or security questions), and Billing Info (e.g. credit card or other payment number, billing address), Purchase Processes, where we may ask you to provide your name and billing info, and Technical and Customer Support Processes, where we may ask you to provide contact info and information related to the issue you are contacting us about. ¹ [...] Although we strive to protect your information, we cannot ensure or warrant the security of such information. There is no such thing as perfect security. We may retain information about you as long as it is necessary for us to fulfill the purposes outlined in this policy. In addition, we may retain your information for an additional period as is permitted or required to, among other things, comply with our legal obligations, resolve disputes, and enforce agreements. Where required by applicable law, we shall delete your information when the information is no longer necessary or requested to do so. Even if we delete your information from active databases, the information may remain on backup or archival media as well as other information systems.
Take-Two Interactive	Leading global publisher, developer, and marketer of video games.	The types of information collected in connection with the activities listed above will vary depending on the activity. The information we collect may include personal information such as your first and/or last name, e-mail address, phone number, photo, mailing address, or payment information. [...] Personal information collected by the Company is stored in secure operating environments that are not available to the public (e.g., locked rooms).
Valve	Game developer and game distribution platform ("Steam") for computers and consoles.	By using Valve's online sites, products, and services, users agree that Valve may collect personally identifiable information (as defined below). [...] "Personally identifiable information" is information that can be used to uniquely identify a user, such as name, address or credit card number. [...] Personally identifiable information provided to Valve will be collected, processed and stored by Valve Corporation in the United States.

Note:

1. Original formatting was changed for consistency.

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